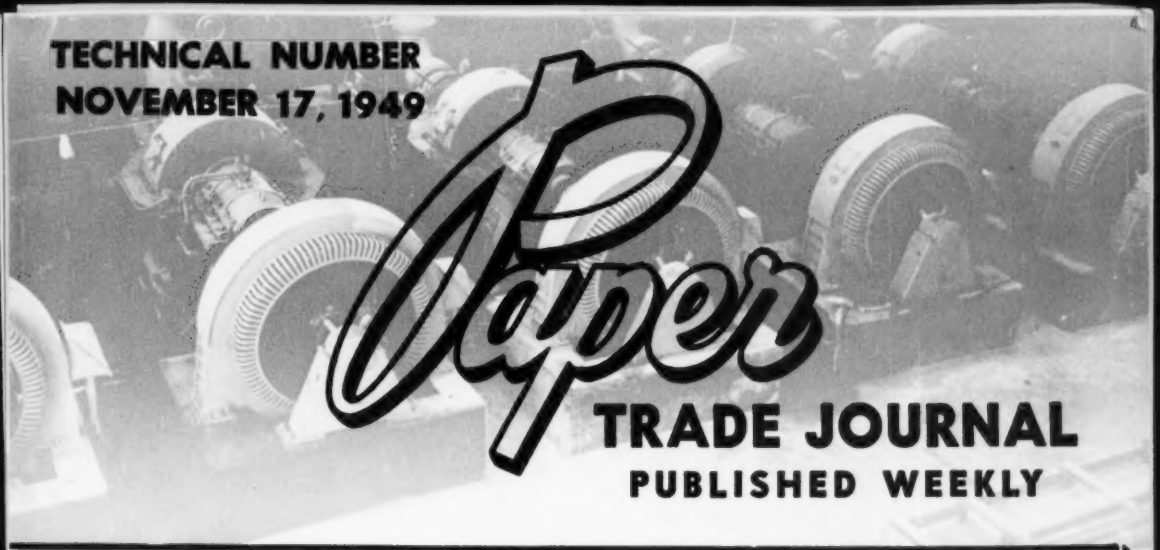
TECHNICAL NUMBER
NOVEMBER 17, 1949



Paper TRADE JOURNAL

PUBLISHED WEEKLY

Thanksgiving Day
1949

"We have been a most favored people. We have been a most blessed people. We ought to be a most thankful people."

CALVIN COOLIDGE

GOTTESMAN & COMPANY
— INCORPORATED —

NO MORE EFFECT THAN A *Feather* ON THE ROCK OF GIBRALTAR.....

You can imagine what effect a feather would have in deflecting the Rock of Gibraltar. The rolls in a Downingtown Smoothing Press DO NOT HAVE ANY CROWN, yet comparatively they are as non-deflecting as the "Rock," under the feather. This means that no matter how much, or how little, you weight the roll at the ends, the nip pressure is always uniform across the entire sheet, regardless of sheet caliper, thus minimizing blowing, crushing and checking, etc.

Should you need a smoother sheet and a higher finish to meet today's competitive market, the Downingtown Smoothing Press must receive serious consideration, as it is a salient factor in the solution of your problem.

Downingtown Smoothing Press Rolls are mounted in anti-friction bearings and, when necessary, a rope carrier is provided to feed the sheet into the rolls.

May one of our engineers call to discuss the improvement of the quality of your sheet with a Downingtown Smoothing Press; also to explain how, without crown, uniform nip pressures are assured at all loadings. Write us.

DOWNINGTOWN MANUFACTURING COMPANY

DOWNINGTOWN, PA.

DESIGNERS AND BUILDERS OF PAPER MAKING MACHINERY SINCE 1880

Save Mounting Time

With *Easy-to-Align* Magic-Grip SHEAVES

YOU CAN MOUNT a *Magic-Grip* sheave faster than any other sheave you can buy . . . and demount it just as fast. To mount, simply slide the sheave onto the shaft and tighten three screws. To demount, use the screws to break the grip of the tapered bushing and the sheave can be slid off easily.

You save time and eliminate the danger of damaged bearings and shafts from forcing and hammering. A hex socket wrench is the only tool needed and anyone can line up the sheave perfectly. Sizes 1 to 250 hp.

Most Complete V-belt Line

Get everything you need for your V-belt drives from one reliable source. *Texrope* offers the broadest line of V-belts, standard and variable-speed sheaves and speed changers plus the extra engineering skill that comes from more industrial V-belt installations in operation than any other manufacturer.

Get your copy of the 144 page *Texrope* Pre-Engineered Drive Manual from your A-C Authorized Dealer or Sales Office or write for Bulletin 20B6956. Also in Sweet's.

A-2835

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MILWAUKEE, WIS.

Texrope and *Magic-Grip* are Allis-Chalmers trademarks.

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Applied . . .
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MOTORS — ½ to 25,000 hp and up. All types.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

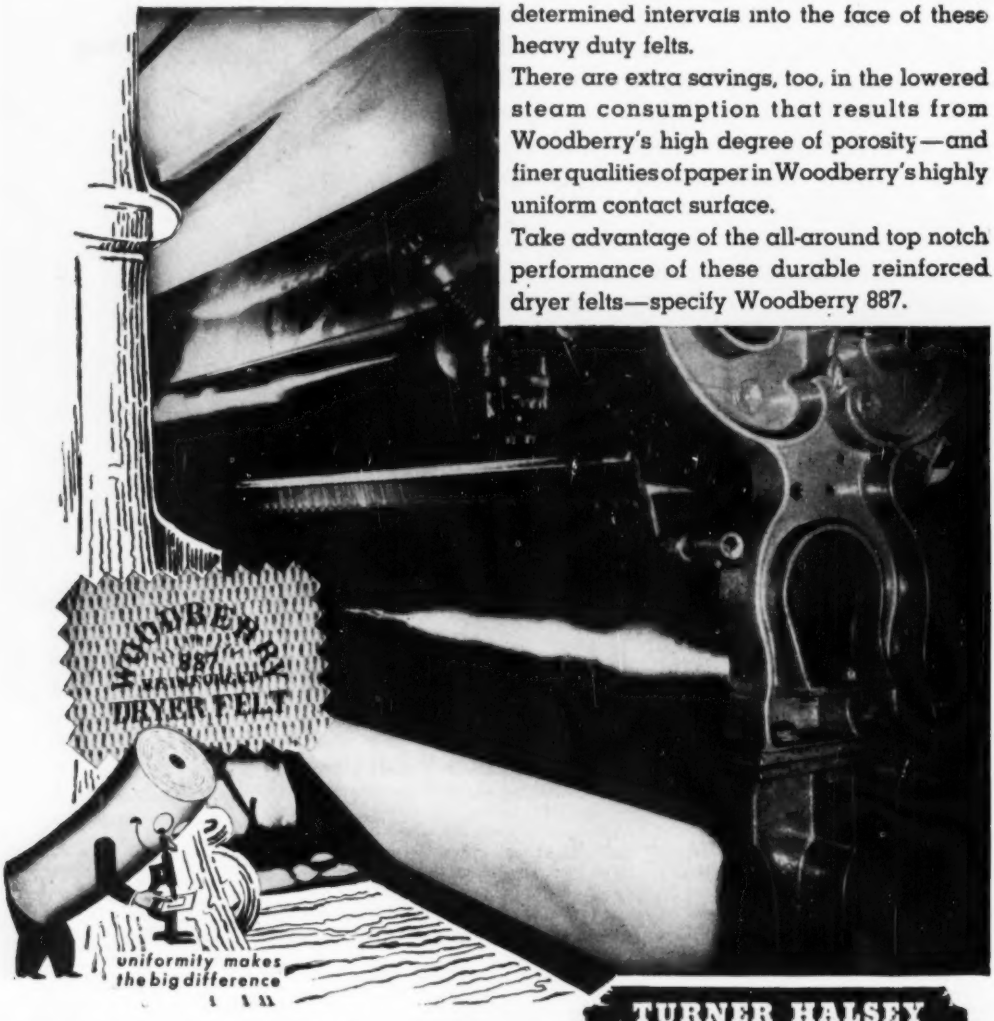
PUMPS — Integral motor and coupled types. Sizes and ratings to 2500 GPM.

You're Facing Extra Savings With Woodberry 887 Dryer Felts

There are hours and hours of extra wear in Woodberry 887 dryer felts. It's the result of Woodberry's patented feature—asbestos yarns woven at scientifically determined intervals into the face of these heavy duty felts.

There are extra savings, too, in the lowered steam consumption that results from Woodberry's high degree of porosity—and finer qualities of paper in Woodberry's highly uniform contact surface.

Take advantage of the all-around top notch performance of these durable reinforced dryer felts—specify Woodberry 887.



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MEMBER

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Paper TRADE JOURNAL

VOL. 129 NO. 21

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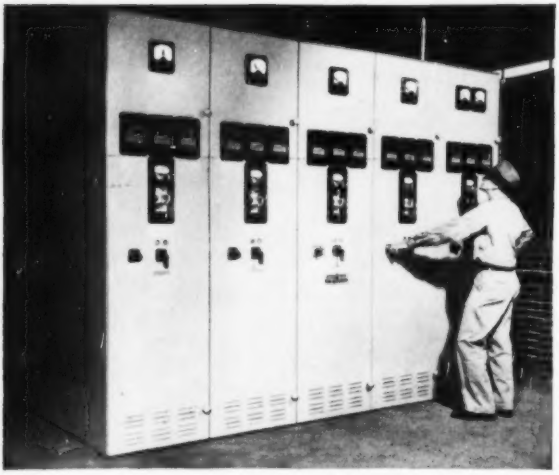
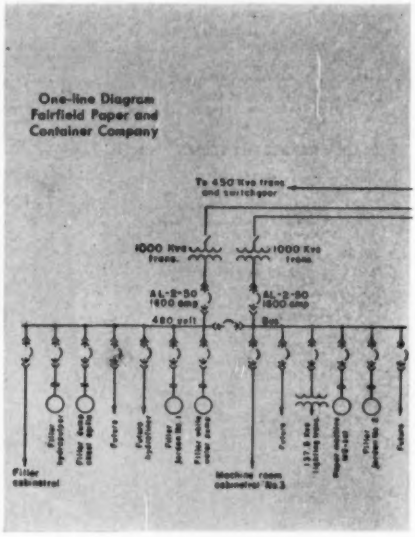
FAIRFIELD
PAPER AND CONTAINER CO. chooses a
METAL-CLAD
for



General Electric 5-kv Type MI-6 metal-clad switchgear consisting of one incoming-line breaker and four feeder breakers to handle 4160 volts at Fairfield Paper and Container Co. Magne-blast air circuit breakers are rated 1200 amperes, 100,000 kva interrupting rating. Note neat appearance of metal-clad unit. It's space saving too, and the metal-clad construction offers operating safety to personnel. Units like this are easily installed and can be added to with a minimum of bother and expense. Instruments and relays are co-ordinated for positive protection of circuits.



G-E Cabinetrol units provide centralized control for the liner stock system. Unit controls motors, valves, agitators, etc. Ammeters record load carried by hydrapulper and hydrofiner. Four other Cabinetrol units are used throughout the mill.

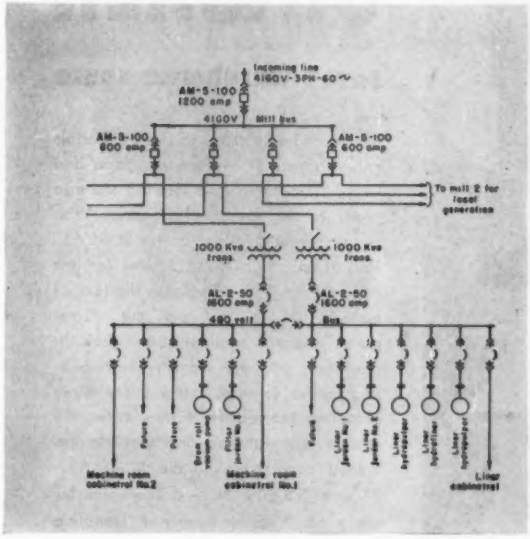
The Fairfield installation is a complete General Electric project—one source of responsibility plus the very best in co-ordinated planning, engineering, manufacturing, and servicing facilities to give maximum savings and efficiency to the customer.

Two G-E low-voltage metal-enclosed switchgear equipments take the 480-volt power from the 1000-kva transformers and distribute it to motors, lighting transformers, and five Cabinetrol units. The Type AL-2 transformer secondary breakers and tie breakers are rated 1600 amperes, 50,000 amperes interrupting rating. Type AK-1 drawout air circuit breakers of 25,000 ampere interrupting rating are used to feed motors and Cabinetrol. Breakers for future circuits can be installed in spare compartments. G-E air circuit breakers have adequate "IC" (Interrupting Capacity) for short circuit protection, are easily removed for inspection.

secondary-selective system using

SWITCHGEAR

continuity of service



At the new Fairfield Paper and Container Co. installation General Electric metal-clad switchgear receives the incoming 4160-volt power and distributes it to 4-1000 kva transformers for step-down to 480 volts. G-E metal-enclosed switchgear handles the 480-volt power through air circuit breakers of the drawout type. In general, all motors rated 60 hp and above are served by an individual breaker. Five Cabinetrol units are fed by air circuit breakers. Note that costly secondary feeders are short.

This secondary-selective system is only slightly higher in cost than a simple radial system, and provides Fairfield insurance against a complete shutdown in case of failure of any one transformer or its primary feeder cable. If trouble occurs the normally-open tie breaker is closed, thus providing an alternate source of power which permits the mill to operate at slightly reduced capacity.

Be sure to see the "More Power to America" full-color sound slidefilm "Modern Industrial Power Distribution." Ask your G-E sales representative to arrange a showing for your organization.

here's why...

"When we planned our new facilities it was decided that a secondary-selective power distribution system would assure us of the continuous power, even in case of a major fault, needed for continuous-process operations like ours. We ordered G-E switchgear because their "metal-clad" protection safeguarded our employees, and because we could get all engineering, equipment and service from one organization. By dealing with one company we saved considerable time and money. The units arrived complete and we installed them in very little time."

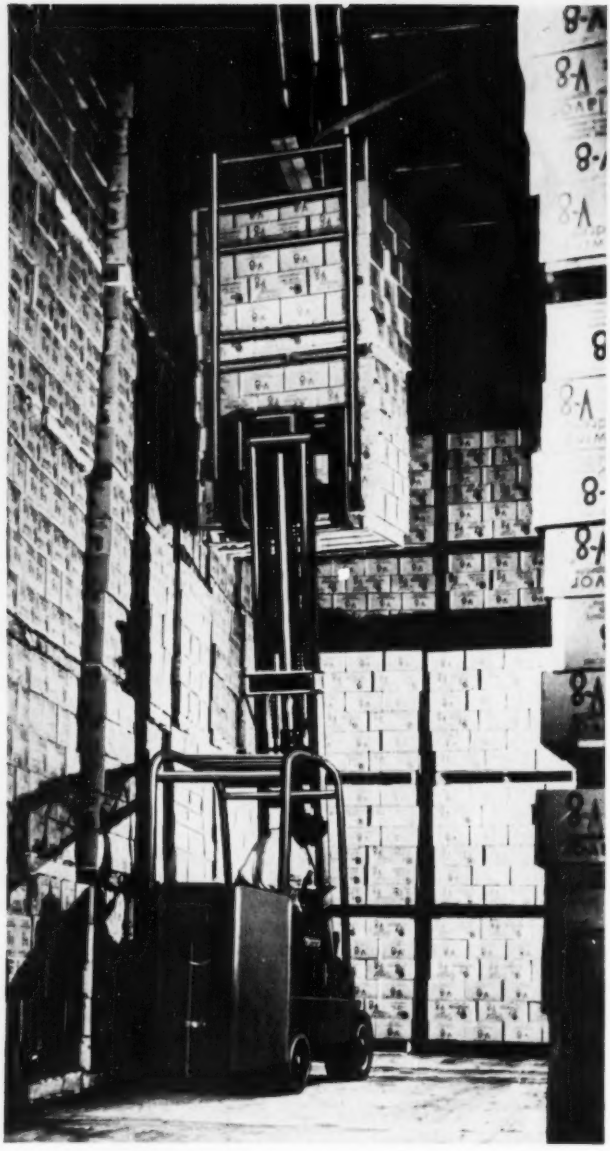
H. L. CUSTER, VICE PRESIDENT AND GENERAL MANAGER, THE FAIRFIELD PAPER AND CONTAINER CO., BALTIMORE, OHIO

MODERN INDUSTRIAL power distribution systems using G-E switchgear are applicable to any industrial plant or commercial building where you want proper voltage for top performance of equipment, an extremely flexible setup to take care of expanding or changing loads, adequate short circuit protection, safety to personnel, and low installation and maintenance costs. A complete system, using G-E switchgear, costs you less than a "piece-meal," makeshift affair.

INVESTIGATE TODAY the many advantages of using General Electric switchgear in *your* plant for efficient, flexible power distribution. Contact your G-E sales representative for further information—or write for the helpful bulletins listed below. *Apparatus Department, General Electric Co., Schenectady 5, New York.*

GEA-3083	Metal-clad Switchgear
GEA-4966	Low-voltage Metal-enclosed Switchgear
GEA-3592	Load-center Unit Substations
GEA-3758	Load-center Power Distribution
GEA-4057	Interlocked-armor Cable for Primary Circuits
GEA-4352	Flamenol Cable for Secondary Circuits

GENERAL ELECTRIC



every handling job is easier with TOWMOTOR MH!

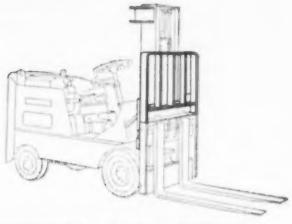
TOWMOTOR
THE ONE-MAN-GANG

FORK LIFT TRUCKS and TRACTORS

HIGH STACKER

saves warehouse space

Towmotor Fork Lift Trucks stack materials and products of every size, shape and weight, doubling and tripling storage areas, freeing valuable floor space. With certain models, loads can be lifted 65" without raising mast . . . ideal for low ceiling areas . . . simplifying the task of moving supplies "in" and "out." Compare Towmotor with any other fork lift truck and you will see why Towmotor-Engineered features make every **M**ass **H**andling job easier, faster, safer. 10 models plus standard and specially designed accessories handle loads from 1500 to 15,000 lbs.—a Towmotor for *every* job. Write for a copy of "Handling Materials Illustrated." Towmotor Corporation, Division 17, 1226 E. 152nd St., Cleveland 10, Ohio. Representatives in all Principal Cities in U. S. and Canada.



EXTENSION BACK REST

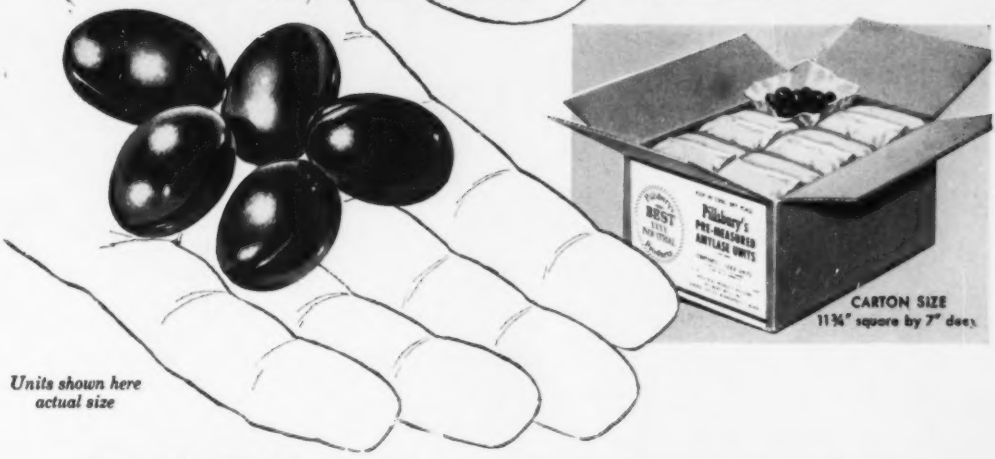
—another Towmotor Efficiency Feature

An extension accessory for the vertical carriage frame. Facilitates handling of unusually high multi-unit loads with normal stability and safety. Can be attached or removed in a few seconds.

RECEIVING • PROCESSING • STORAGE • DISTRIBUTION

Revolutionary New Enzyme Development for Coating and Tub Sizing!

Pillsbury's PRE-MEASURED AMYLASE UNITS PAT. PENDING



Units shown here actual size

For the First Time... Enzyme Charges in Soluble Capsules

In the preparation of coatings and tub sizings from starch, the new Pillsbury's Pre-Measured Amylase Units offer you—

Simplicity—No more weighing or measuring of enzymes. *Just count* the small number of units required and toss them into the slurry.

Efficiency—Fully protected right up to the moment they are used, these standardized enzyme charges are released at the correct point for greater efficiency.

Economy—Total cost of converting is brought down to very few cents per 100 pounds of starch in the average mill. Measuring and handling losses are eliminated, too.

Accuracy—No more errors in weighing and measuring enzymes. These stable enzyme units retain their potency indefinitely with ordinary care.

Superiority—The enzyme in Pillsbury's Pre-Measured Amylase Units has been selected because of its superior starch-converting properties. It assures end products of maximum adhesiveness and with minimum of specks.

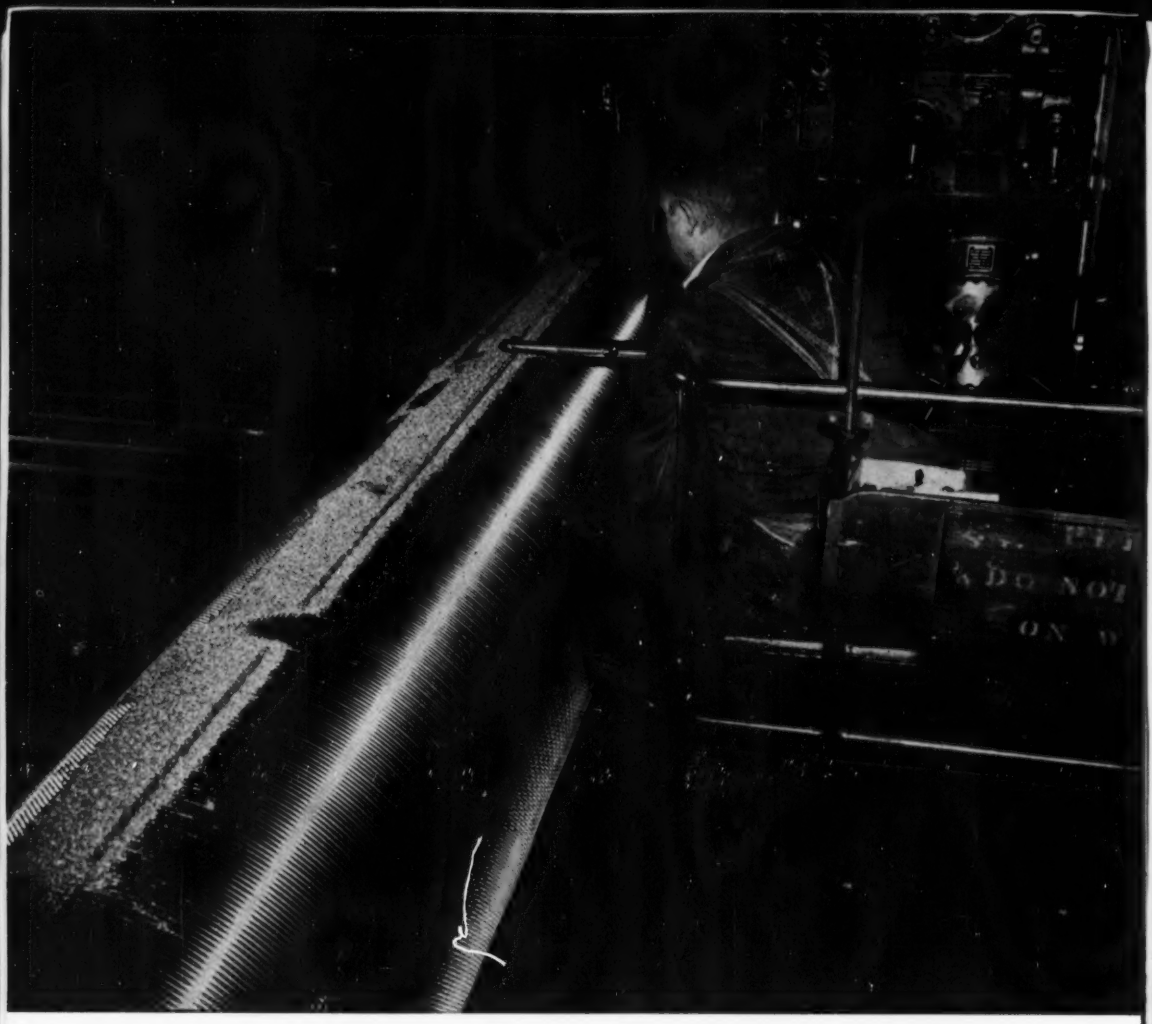
Convenience—Easy to use and store. These units come packed in small cartons, 11¾" square and 7" deep. This compact size permits speedy parcel post delivery, minimum storage space, and enables your plant to operate on smaller inventories.

Write for Full Information—Pillsbury's technical service offers you the experience and technical know-how of men seasoned in the application of enzymes in industry. They are at your service and will cooperate with your organization in running trials without obligation.

Pillsbury's BEST XXXX INDUSTRIAL Products

©P. M. I.

PILLSBURY MILLS, INC., INDUSTRIAL PRODUCTS DIVISION, MINNEAPOLIS, MINNESOTA



PRECISION EXACTNESS

There's as much care and attention to detail in the manufacture of a Bagley and Sewall Paper Machine as in the making of a fine watch . . . a precision exactness that over the years has become charactertistic of the workmanship in the Bagley and Sewell Plant.

Beginning with the engineering department and continuing through the pattern shop, foundry, machine shop, erection and inspection departments, there's a close attention to detail. Every effort is made toward perfection. That is why Bagley and Sewall Paper Machines are doing such an excellent job.

When considering new equipment or innovations in your present machines, let us know. We'll gladly give you the benefit of our more than 79 years' experience in paper machinery manufacture.

BAGLEY & SEWALL

DESIGNERS AND BUILDERS OF PAPER MAKING MACHINERY

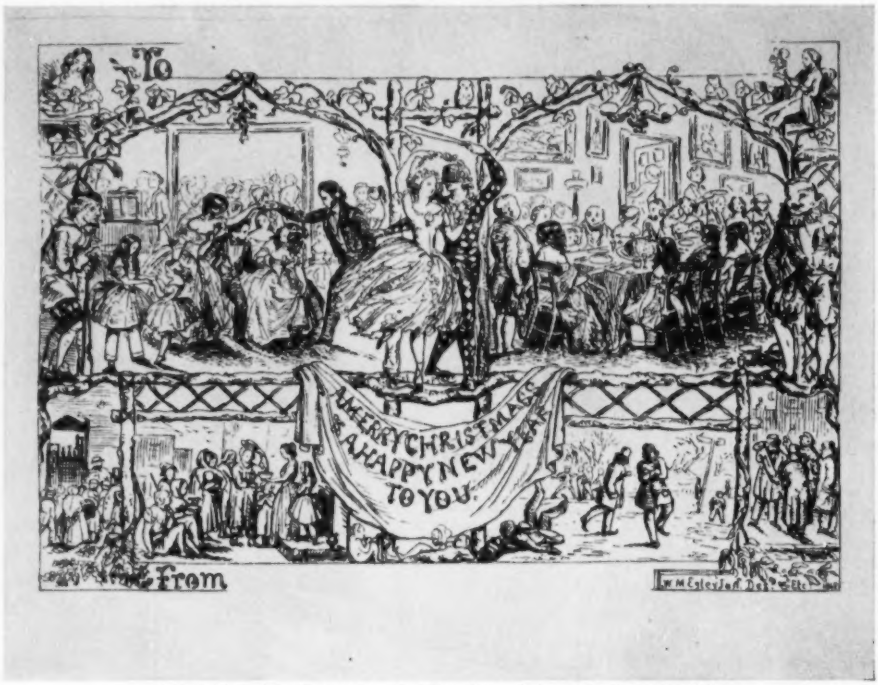
WATERTOWN, NEW YORK

Fire is Forest Enemy No. 1. In most years more trees are destroyed by fire than are harvested! And the pity of it all is that most fires are caused by human carelessness and ignorance of the far-reaching consequences. Nine out of ten fires can be traced to man. Careless smokers *alone* cause one out of four.

The men and management of Weyerhaeuser Timber Company are keenly alive to the necessity of protecting forest lands from fire. Since 1903 the Weyerhaeuser organization has been participating in cooperative fire protection efforts with other private forest owners and with State and Federal agencies.

Supplementing its fire protection activities, the Weyerhaeuser forestry management program also includes relentless insect and disease control throughout its extensive timber tracts and the company's eight thriving Tree Farms which are producing harvests for the future.

Furthered by this constructive forestry policy, the Pulp Division represents a reliable and continuing source of supply for consumers of bleached chemical woodpulp.



Facsimile of the first-known Christmas Greeting Card. Original now on display in the British Museum in London.

The First Christmas Card

When, in 1842, William Maw Egley, a young London engraver's apprentice, produced the first-known Christmas card, he started what was destined to become both a popular custom and a major industry. While the Christmas card originated in England, the sending and receiving of greeting cards has attained its greatest popularity in America. Today more than two hundred greeting card publishers produce more than three billion cards annually. It is estimated that nearly one hundred million dollars is now spent each year to mail greeting cards of all types and for all occasions—a sum representing approximately ten percent of the Government's first-class mail revenue.

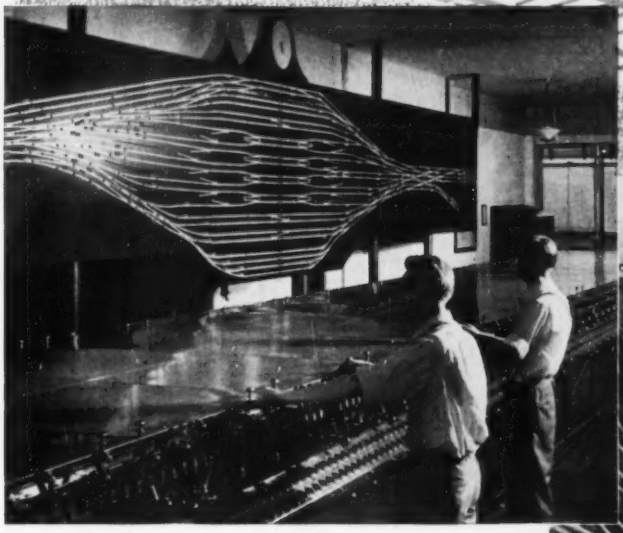
In reaching such a vast volume, greeting cards have become one of the largest users of paper, and thus have made an important contribution to the swift, continuous growth of America's pulp and paper industry.

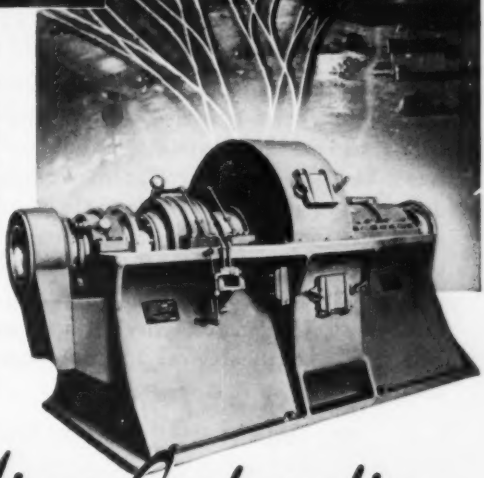
The dramatic story of paper is told in the sound-and-color film, "Paper — Pacemaker of Progress," and in a book under the same title. Both are presented by F. C. Huyck & Sons as a tribute to the Paper Industry. The book will be sent free upon request.

F. C. HUYCK & SONS · *Kenwood Mills* · RENSSELAER, N. Y.

KENWOOD WOOL PRODUCTS
HUYCK *Felts*

Switching Grades as Easy with a SUTHERLAND as switching trains . . .





One Sutherland recently started up on a kraft specialty machine and during its first week of operation ran 28 grades, these covering a wide range. Sheets were all better formed and showed more uniformity in test. Higher tear was produced with equal or greater mullen; also, tear was much closer together in both directions. All this, of course, with the usual Sutherland power savings. . . . Other Sutherlands are operating on sulphite and sulphate machines.

REMINDER—Don't think for one minute that Sutherlands apply only to large, one grade machines. We can prove that anyone can "Save with Sutherlands." Write us.

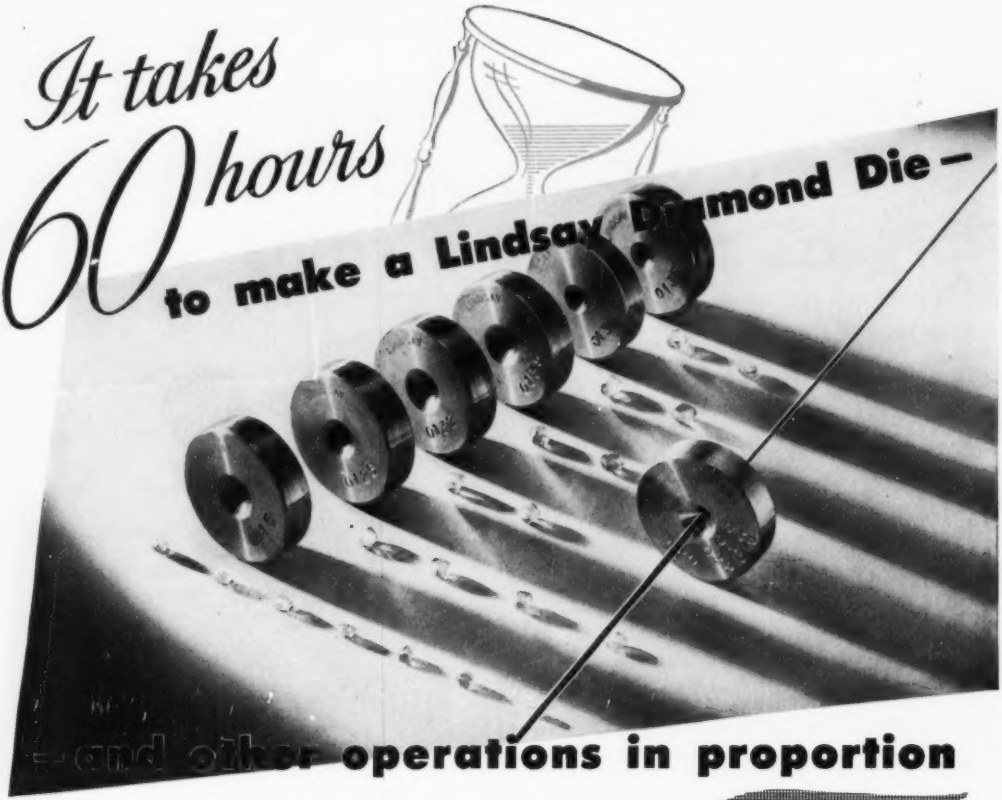
Sutherland Refiner Corporation

TRENTON, NEW JERSEY

Manufactured in the United States by Valley Iron Works Co., Appleton, Wisconsin
Sutherland Refiner Limited, Windsor Hotel, Montreal, P. Q.

It takes 60 hours

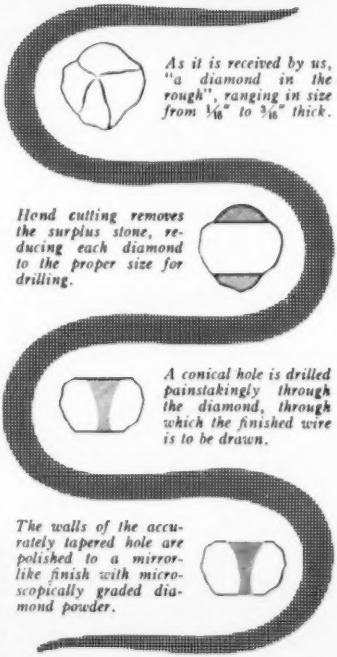
to make a Lindsay Diamond Die—



—and other operations in proportion

It's a case of *Care, Care, and More Care*

From the sampling of wire from every coil through to the meticulous, speck-less packing of every Lindsay Fourdrinier wire in its box, almost unbelievable care presides over every step in Lindsay manufacture. The tedious making of a Lindsay diamond die is an illustration. Nor is the wire drawing process more precise than the testing that follows—testing for grain size, elongation, tensile strength, yield point and other properties. Ceaseless laboratory control hovers over every phase of the process. The "end objective" is a superior Fourdrinier wire cloth whose quality has progressed steadily ever since Lindsay's origin some 46 years ago.


As it is received by us, "a diamond in the rough", ranging in size from 1/16" to 3/16" thick.
Hand cutting removes the surplus stone, reducing each diamond to the proper size for drilling.
A conical hole is drilled painstakingly through the diamond, through which the finished wire is to be drawn.
The walls of the accurately tapered hole are polished to a mirror-like finish with microscopically graded diamond powder.

THE LINDSAY WIRE WEAVING COMPANY
14801-14299 ASPINWALL AVENUE
CLEVELAND 10, OHIO

Lindsay **WIRES**
FOR PAPER MILLS

AMAZING GLUE CRYSTALS

PAISLEY *DEHIDRI GLUE CRYSTALS

Not a flake or powder . . they are tiny granules that absorb water faster without lumping or forming a sludge. Available in many useful water taking grades. Handles a multitude of paper converting, paper container and box manufacturing, and packaging operations.

Made by the exclusive *DEHIDRI PROCESS

*DEHIDRI crystals are definitely superior to previously known cold water soluble glues. Tell us your gluing operation. We'll send demonstration sample at once!

*Patent applied for.

SIMPLE AS A-B-C

A
ADD CRYSTALS TO WATER

B
MIX A FEW MINUTES

C
PUT INTO MACHINE, IT'S READY TO USE

Paisley SCIENTIFIC ADHESIVE SERVICE

PRODUCTS INCORPORATED

1770 CANALPORT AVENUE, CHICAGO 16, ILL. PHONE CANAL 6-2219
630 WEST 51st STREET, NEW YORK 19, N.Y. PHONE COLUMBUS 5-2860

Manufacturers of Glues · Pastes · Resin Adhesives · Cements and related Chemical Products

LINK-BELT *Screw Conveyor*
···*Tops in Efficiency!*

Bulk materials handling reduced to its simplest terms is represented by Link-Belt screw conveyor. Applicable to a wide variety of handling jobs it is the preferred method in thousands of plants in greatly diversified industries. Simple in construction, with a minimum number of moving parts, it is easy to install, economical to operate, requires negligible attention or upkeep.

Compact, it occupies less space than other types of conveyors; has no return run.

Dust-tight, it protects contents against waste or contamination.

Adaptable, it operates at any angle, and will perform mixing, blending or feeding operations with elevating, lowering or horizontal conveying. Note inset photograph showing parallel flights of opposite hands, in common trough.

Link-Belt Company originated and is the largest producer of Helicoid continuous rolled conveyor flighting. Link-Belt screw conveyor is also made in sectional form, in a wide range of diameters, gauges and pitches, and in various metals.

Link-Belt engineers invite your request for information or assistance in planning efficient low-cost screw conveyor installations. Contact our nearest office.

11.549

TYPES OF LINK-BELT CONVEYING MACHINERY

Belt Conveyors	Apron Conveyors
Screw Conveyors	Oscillating Conveyors
Bulk-Flo Conveyors	Flight Conveyors
Chain Conveyors	Bucket Elevators
Trolley Conveyors	Bucket Carriers

LINK-BELT COMPANY Chicago 8, Indianapolis 6, Philadelphia 40, Atlanta, Dallas 1, Houston 3, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8. Offices in Principal Cities.

LINK-BELT

CONVEYING MACHINERY

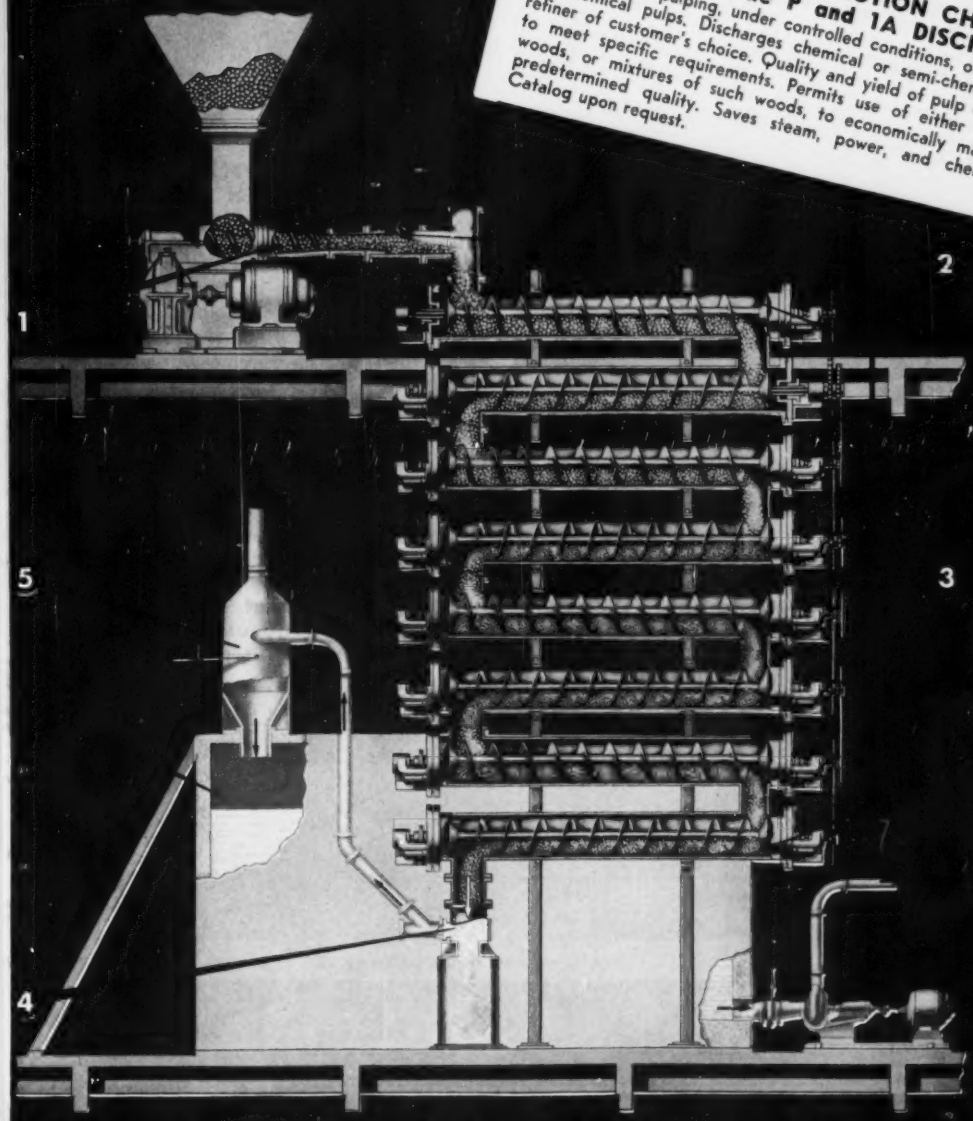
"THE COMPLETE LINE"

CHEMIPULPER

PATENTED AND PATENTS PENDING

WITH FOUR-UNIT REACTION CHAMBER
as used with the P and 1A DISCHARGER

For continuous pulping, under controlled conditions, of chemical and non-chemical pulps. Discharges chemical or semi-chemical pulps to refiner of customer's choice. Quality and yield of pulp can be varied to meet specific requirements. Permits use of either hard or soft woods, or mixtures of such woods, to economically make pulps of predetermined quality. Saves steam, power, and chemical costs. Catalog upon request.



PAPER and INDUSTRIAL APPLIANCES, INC.
122 EAST 42nd STREET ● NEW YORK 17, N. Y.

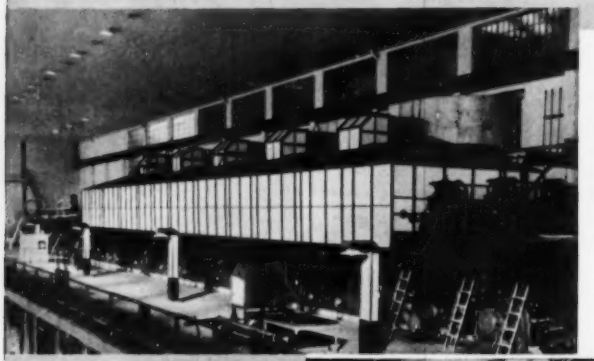
. . . and now in AUSTRALIA

ROSS

ASSOCIATED PULP & PAPER MILLS LTD.

BURNIE, TASMANIA

IS COMPLETELY EQUIPPED WITH.. Air Systems

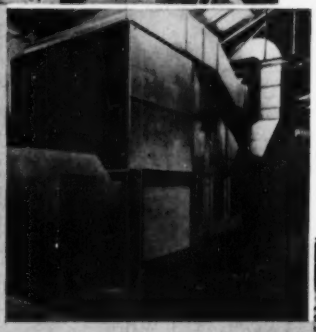


Wherever in the world paper is made ROSS Air Systems become an essential part of the papermaking process. They are practically standard mill equipment throughout the industry in the United States, Canada, Europe, Mexico, South America—and now Australia!

This complete Australian installation was engineered and installed jointly by the J. O. ROSS ENGINEERING CORPORATION and H. P. GREGORY & CO. PTY. LTD.

In a country where fuel costs are necessarily high, the operation of ROSS Air Systems naturally proves highly profitable. It is significant that work is already underway on five other installations in Australia.

Ross Hood and Exhaust connections, showing ceiling outlets and Spot Cooling apparatus. Machine is equipped with Briner Economizers, Ross-Grewin and Bottom Fall Supply Systems.



Inlet side of Ross Briner Economizer heating air by exhaust vapors from machine. This heated air is distributed through special ceiling outlets for roof heating.

The Ross Briner Economizer apparatus on enclosed platform located over hood in back of No. 3 Machine.

ROSS SYSTEMS

J. O. ROSS ENGINEERING CORPORATION

MANUFACTURERS OF AIR PROCESSING SYSTEMS

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201 N. Wells Street, CHICAGO 6 • 79 Milk Street, BOSTON 9 • 9225 Grand River Avenue, DETROIT 4 • 600 St. Paul Avenue, LOS ANGELES 14
ROSS ENGINEERING OF CANADA, LIMITED, MONTREAL 32, CANADA • CARRIER-ROSS ENGINEERING COMPANY, LIMITED, LONDON, ENGLAND
Australian Representative: H. P. GREGORY & CO. PTY. LTD.—SYDNEY

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with Brown Flow Accounting Meters

Your costs for distribution and utilization of steam (or other fluid) will be known facts with the installation of Brown Flow Accounting Meters. Hourly and daily records from your Brown Flow Meters will enable you to know, not approximate, what is happening . . . where it is happening . . . when it is happening. You can deal a knock-out blow to waste and properly pro-rate expenses for each operation and each department. The Brown Flow Accounting System is producing sensational economies in many plants, repaying the original investment in a very short time.

Check, today, on the application of Brown Flow Accounting Meters to your processes! You can get detailed information in Bulletins 2022 and 2801 . . . send for your copies!

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BROWN INSTRUMENTS — WORLD'S LARGEST ORGANIZATION FOR ADVANCED INSTRUMENTATION AND CONTROL — DIVERSIFIED VALVES

Brown Recording Integrating Flow Meters are not expensive! For example, a complete unit for a six inch steam line costs less than $500.00!

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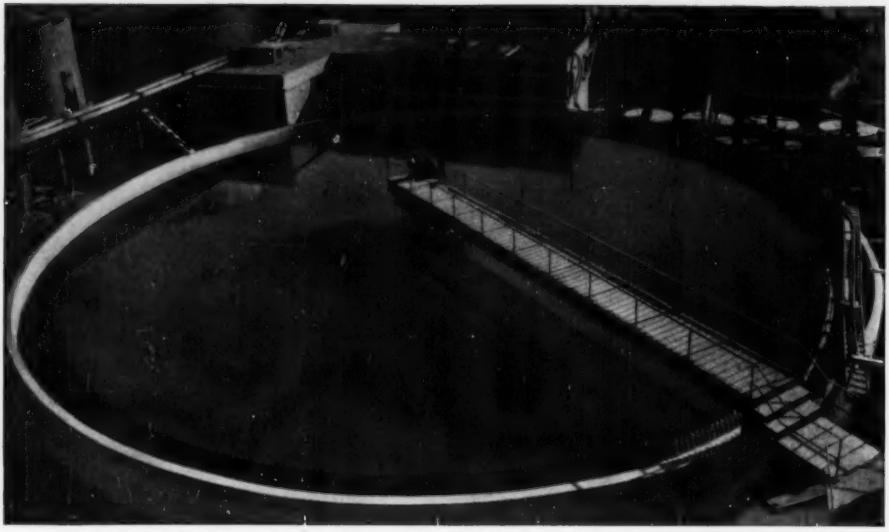
LOW COST **INDUSTRIAL WATER TREATMENT**



with the DORRCO HYDRO-TREATOR

The Dorrco Hydro-Treator is a high rate, upflow water treatment unit that gives you flocculation, sludge thickening and clarification in a *single*, compact structure. As feed is distributed, heavy, gritty solids quickly settle to the floor of the Flocculator compartment and are raked inward to the central discharge cone. Light, flocculated solids drift into the sludge well, and are thickened as they settle to the discharge cone. Clarified water is overflowed at the surface.

Treatment is *effective* because raw water is distributed evenly and without disturbance throughout the entire flocculation zone . . . because the rotating distributor arms maintain uniform flocculation conditions . . . because zoned sludge thickening promotes maximum density of settled solids. Rotating rakes provide continuous, *positive* sludge removal . . . an essential for high rate treatment.

First cost is held to a minimum by simplicity of Hydro-Treator tank and mechanism design. *Treatment cost* is low because Hydro-Treator mechanism promotes fast chemical reactions without interference among the three treatment zones.

Available in standard sizes ranging from 10 to 100 feet in diameter, the Dorrco Hydro-Treator will handle softening, turbidity, or color removal effectively . . . and with economy. A Dorr engineer will gladly supply more detailed information.

Pictured above is a typical Hydro-Treator installation removing algae, turbidity and color, and producing clear process water for a South American paper mill. A duplicate unit is located alongside the one shown. Total maximum capacity...25 M.G.P. Turbidity reduction...97% from river water supply.

DORRCO

THE DORR COMPANY, ENGINEERS
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RESEARCH AND TESTING LABORATORIES
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Dorr Technical Services and Equipment Are Also Available Through Associated Companies and Representatives in the Principal Cities of the World. Names and Addresses on Request.

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Du Pont Auramine Conc.
Du Pont Rhodamine 5GDN Extra
Du Pont Rhodamine 6GDN Extra
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Du Pont Victoria Green Small Crystals
Du Pont Victoria Pure Blue BO
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SELECTED ACID DYES

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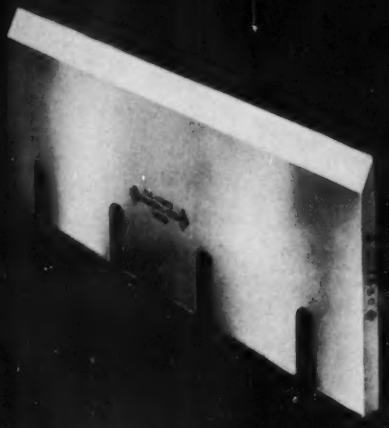
for every industrial need

MOORE & MUNGER—33 Rector Street—New York 6
Marketers of Petroleum Wax for Over Half a Century

First choice for chips



Heppenstall
E.I.S. CHIPPER KNIVES

Mills throughout the country are standardizing on Heppenstall Chipper Knives because these knives continually produce more clean cut, easily-digested chips. Mill men know that with Heppenstall Knives in their chippers, they get fewer oversized or bruised chips . . . high costs of re-chipping and processing are reduced . . . and sawdust waste is held to a minimum.

Made from our own Electric Induction Steels, every Heppenstall Knife is heat treated and precision finished to give you maximum service. Initial costs are low due to our *standardization of chipper knife slot dimensions.* Knife grinding expense is lower, because each knife retains its keen edge longer . . . operates more hours between grinds . . . produces a greater volume of uniform chips per grind.

Why not order your Heppenstall Chipper Knives today? We feel safe in suggesting that under your own operating conditions our knives will deliver a greater quantity of better quality chips—at a lower unit cost than any other knife!

60th ANNIVERSARY 1889 1949

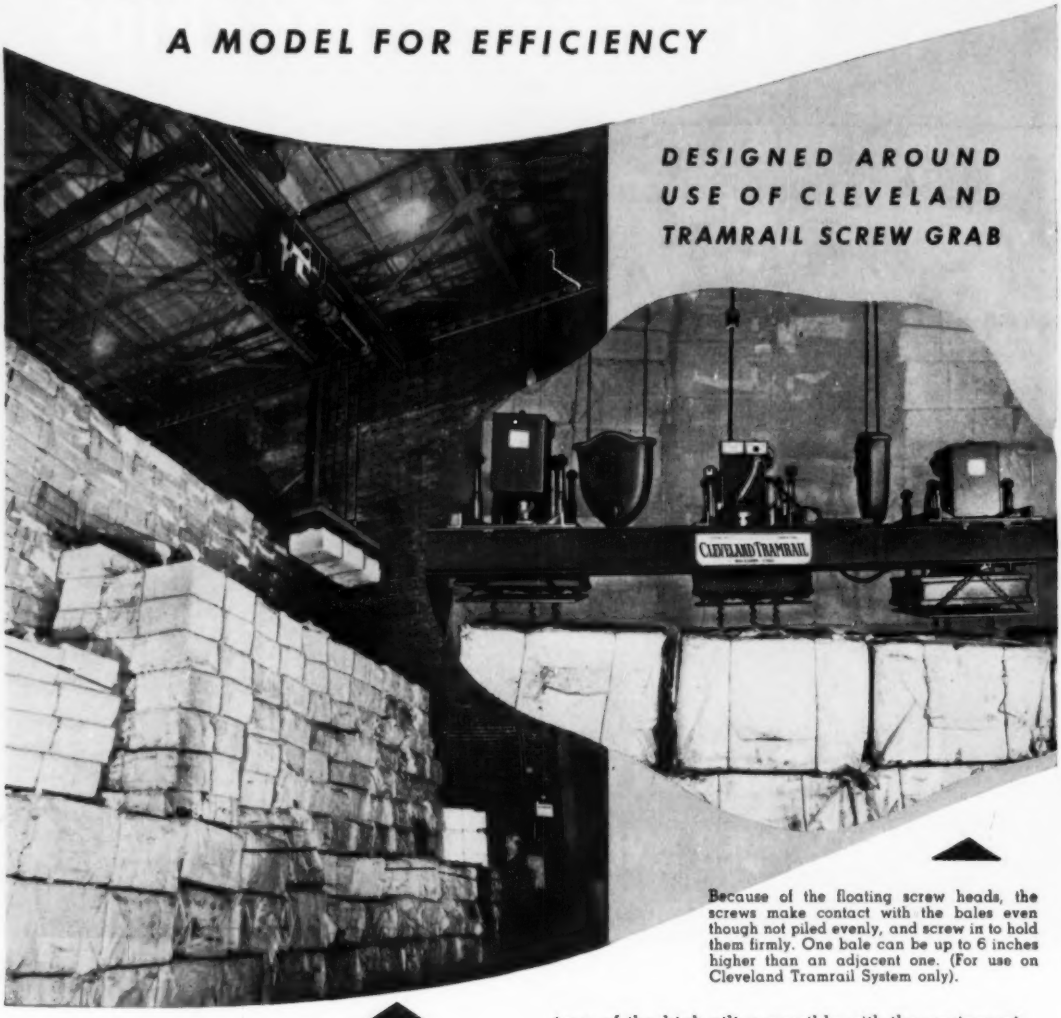
* Write for your free copy of Heppenstall's handy, new wall card outlining correct chipper knife grinding procedure.

HEPPENSTALL COMPANY

PITTSBURGH 1, PA.

HAMMERMILL'S PULP WAREHOUSE

A MODEL FOR EFFICIENCY



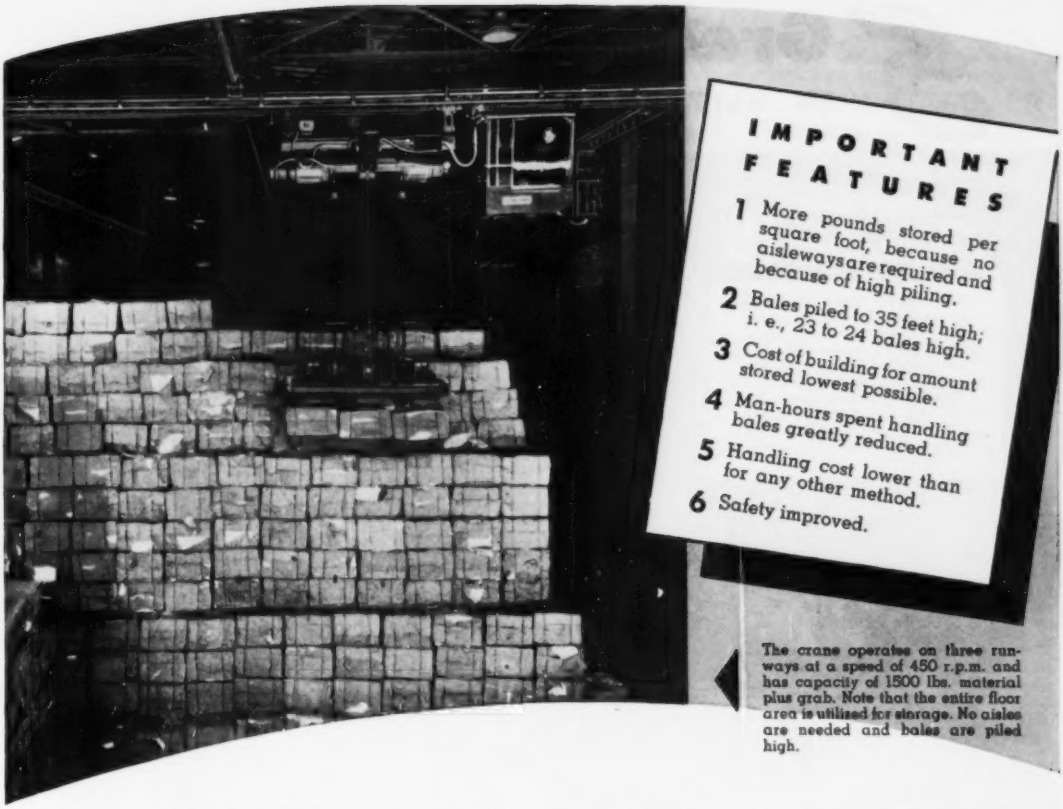
Because of the floating screw heads, the screws make contact with the bales even though not piled evenly, and screw in to hold them firmly. One bale can be up to 6 inches higher than an adjacent one. (For use on Cleveland Tramrail System only).

The ease, speed and accuracy with which the crane operator spots the grab on bales far below is amazing. The distance from tramrail runway track to floor is 45 feet.

The large pulp storage warehouse of the Hammermill Paper Company, Erie, Pennsylvania, completed in 1948, is an outstanding example of efficiency secured through careful advance planning. Having decided that a Cleveland Tramrail Crane and Screw Grab would best serve their needs, they designed a building to properly accommodate a crane and of sufficient height to enable taking advantage of the high piling possible with the equipment.

As a result, Hammermill has a warehouse which will store more pulp for the cost of building than otherwise would be possible. Further, it can handle the pulp in and out of storage at a figure below that possible with any other method.

The warehouse, which has a capacity of 5000 tons, is used primarily for storage of Canadian and Swedish pulp that goes into the fine bond papers for which Hammermill is nationally famous. The pulp comes in packages and is piled up to 35 feet high or stacks of 23 or 24 packages.



IMPORTANT FEATURES

1. More pounds stored per square foot, because no aisleways are required and because of high piling.
2. Bales piled to 35 feet high; i. e., 23 to 24 bales high.
3. Cost of building for amount stored lowest possible.
4. Man-hours spent handling bales greatly reduced.
5. Handling cost lower than for any other method.
6. Safety improved.

The crane operates on three runways at a speed of 450 r.p.m. and has capacity of 1500 lbs. material plus grab. Note that the entire floor area is utilized for storage. No aisles are needed and bales are piled high.

The screw grab has three floating heads, each with three motor-driven screws or augers that screw into pulp and hold it secure when in transit. Three bales can be handled at a time. Because of the floating heads, bales can be picked up even when stacked unevenly and with tops as much as 6" below one another. A light on each head, visible to the crane operator, indicates when the bales are firmly in position.

The handling of all pulp into and out of the warehouse is done by two men, one on the floor and the other in the crane cab. 200 tons can easily be handled in and out of the warehouse in an eight hour day. The bales weigh from 400 to 425 pounds each.

Another feature of the warehouse is the improvement in safety. Because all bales are handled by crane, there is no need of hand-handling and no possibility of usual back strains. Likewise, there is no need of men walking on top of piles and consequent dangers are removed.

THIS BOOKLET STARTS YOU OFF!

Thought-provoking. Informative. Graphically-presented. Write for free copy Booklet No 2014

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
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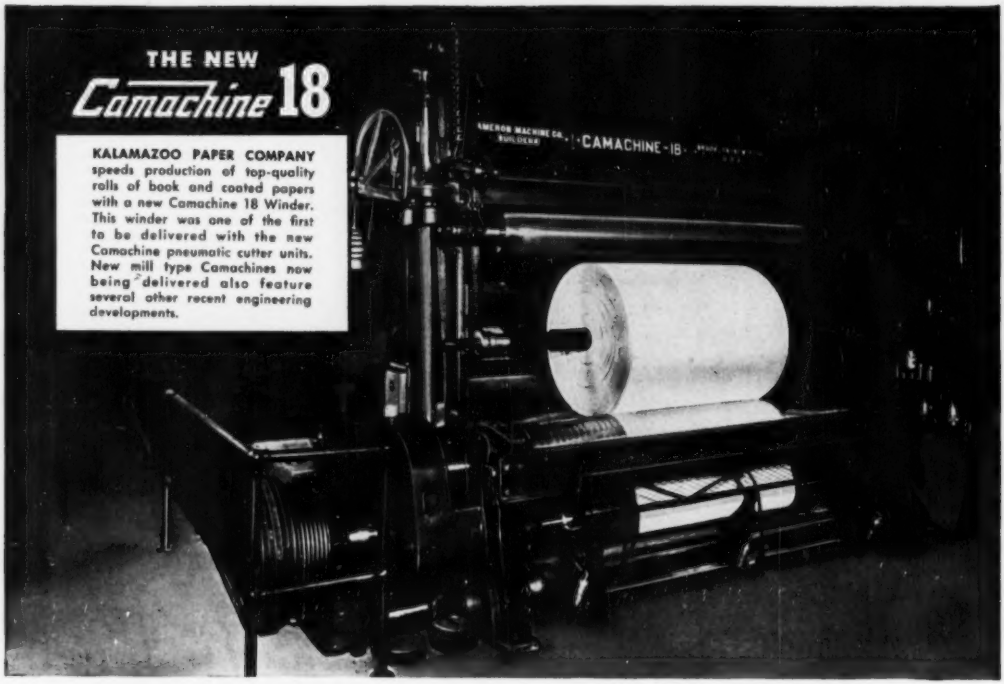
CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

5 Great NEW Values
IN SLITTER-WINDER PERFORMANCE


THE NEW
Camachine 18
KALAMAZOO PAPER COMPANY speeds production of top-quality rolls of book and coated papers with a new Camachine 18 Winder. This winder was one of the first to be delivered with the new Camachine pneumatic cutter units. New mill type Camachines now being delivered also feature several other recent engineering developments.
CAMACHINE-18

NEW CAMACHINES are faster and more dependable than ever. They are easier to adjust and to operate, and are far more responsive to controls. They set unmatched standards for safety and precision. Investigate these five new engineering values.

***NEW!* PNEUMATICALLY CONTROLLED PRESSURE ON CUTTER WHEELS AND CUTTER SPACER BAR.** Assures whistle-clean slitting through longer runs at mile-a-minute speeds. A single control lever sets and maintains uniform pressure on the entire line of cutter wheels. No slow, separate cutter adjustments. No overloaded cutter units. Standard on all new mill-type Camachines.

***NEW!* PUSH-BUTTON CONTROLLED MOTOR-DRIVEN RIDING ROLL LIFT.** Say "goodbye" to another tedious manual operation. Speed up roll changes and add valuable minutes of productive machine and operator time. Standard on Camachine 20; optional on Types 19, 18 and 14.

***NEW!* PNEUMATIC BRAKE ON DRIVE AND IDLER ROLL.** A simple one-hand control brings the fastest, heaviest winder to a s-m-o-o-t-h, quick stop, by braking the drive roll *and* the idler roll simultaneously. This new brake corrects one of the most serious danger spots in big winder operation. Standard on all new mill-type Camachines.

***NEW!* MOTOR-DRIVEN ROLL EJECTOR.** Automatic power—to move the heaviest rolls swiftly and safely to unloading position. So gentle that not a single layer of paper can be damaged. Operates with no more effort than ringing a doorbell. Standard on Camachines 20, 19 and 18; optional on Type 14.

***NEW!* HYDRAULIC ROLL UNLOADING TABLE.** Cushions finished rolls from the winder to the floor in a smooth eight seconds, with push-button stop-and-hold control. The perfect ending for a precision roll-winding operation. Optional equipment on all machines.

Consult with your Camachine representative for complete information regarding these five new developments, and for the facts about other exclusive Camachine features which have been designed to give you faster production of better rolls.

GOOD NEWS!
These new cost-cutting features can be applied to many existing mill-type Camachines! Why not find out now how you can improve the service of your present winder equipment? Write for information.

CAMERON MACHINE COMPANY • 61 POPLAR STREET • BROOKLYN 2, N. Y.

Camachines *FOR FAST, TOP QUALITY ROLL PRODUCTION*
. . . the world over

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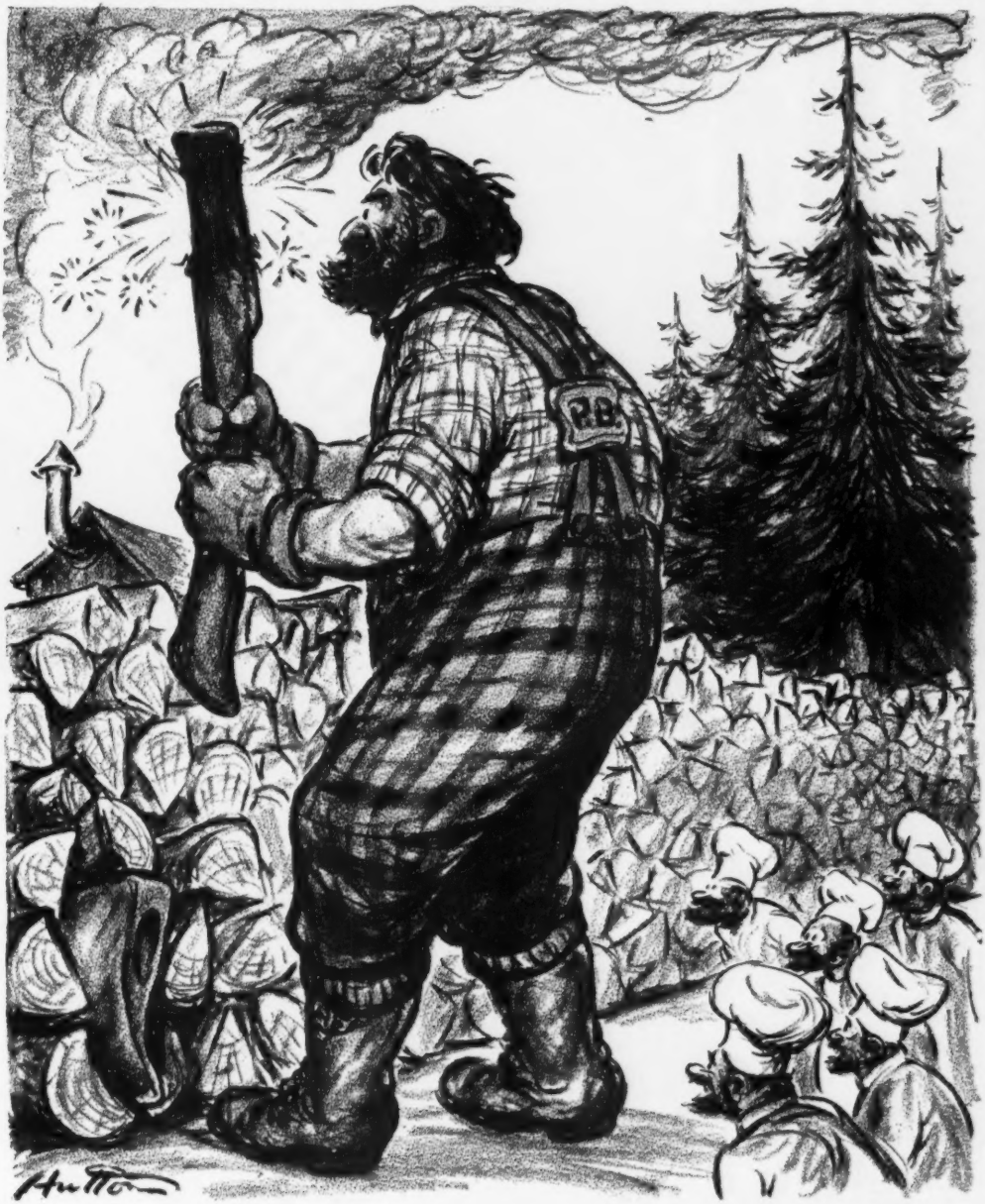
MEAD
pulp

DISTRIBUTORS OF WOOD PULP
BLEACHED AND UNBLEACHED
CHEMICAL AND MECHANICAL WOOD PULP



Paul Bunyan once tried to show the camp cooks how to cut wood for the cookstove. He chopped so fast that he didn't notice anything wrong until he had finished 10 cords. The ax-head had come off and stuck in the very first log.

A reproduction of this incident from the fabulous life of Paul Bunyan—the forty-eighth of a series—will be sent on request. It will contain no advertising.

PULP

Perkins-Goodwin Co.

Established 1846

30 ROCKEFELLER PLAZA, NEW YORK

CHICAGO, ILLINOIS · LUFKIN, TEXAS · STOCKHOLM, SWEDEN

PAPER

Thanks...
60,000 Times
● To you — if you are one of the 60,000 men who operate more than 8,000 Nalco industrial installations — our sincere *thanks.*
Your confidence in the Nalco System of water treatment is the prime factor in a Nalco record of sound, rapid growth that is continuing in step with Nalco research and its resulting developments of even better water treatment chemicals and procedures.
We appreciate your support, and intend to do everything possible to go on deserving it.
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THE Nalco SYSTEM...Serving Industry through Practical Applied Science

A RESEARCH CORPORATION COTTRELL

will save you $1000 to $1500 worth of salt cake every day

The engineer from Research Corporation spoke confidently. He had studied the equipment layout, and noted that the mill had a capacity of 1,000 tons of pulp per day. From his experience and specialized knowledge he knew that he could safely anticipate a minimum recovery of 100 pounds of salt cake for each ton of pulp produced—total: 50 tons of salt cake per day—value: $1,000.00 to $1,500.00 per day dependent upon salt cake cost prevailing at the plant.

Performance like this is the result of over 35 years of experience combined with careful engineering appraisal, attention to details and a remarkably efficient method. These, plus equipment which gives recoveries of 90 to 99%, are responsible for outstanding records of recovery.

If you are losing your chemicals through the stack in a soda or sulphate mill investigate the Research Corporation Precipitator.

RC-108

Research Corporation Installations

47 CARBON BLACK PLANTS
200 METALLURGICAL INSTALLATIONS
203 ACID PLANTS • 34 PAPER MILLS
262 DETARRING INSTALLATIONS
195 POWER STATIONS
71 STEEL PLANTS • 95 OIL REFINERIES
AND MISCELLANEOUS INSTALLATIONS

RESEARCH CORPORATION

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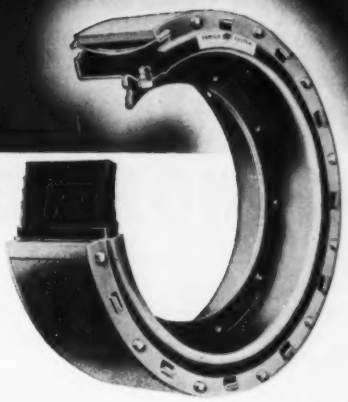
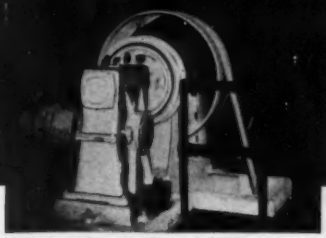
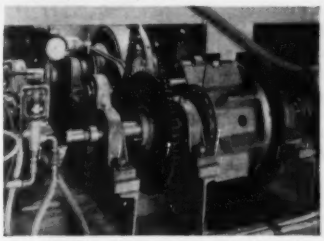
FAWICK-EQUIPPED MACHINES



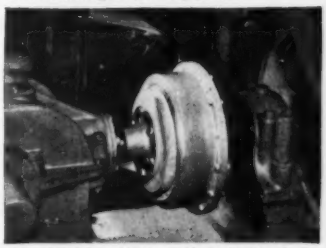
Fawick Air-Ring Clutch or Brake Type E



Fawick Airflex Clutch on Calender Drive of No. 2 Paper Machine at Howard Smith Paper Co., Ltd., Cornwall, Ont.



Fawick Airflex elements used as tandem slip, forward, and reversing clutches on Automatic Roofing Paper Machine by Roofing Machinery Manufacturing Co., Chicago, Ill.



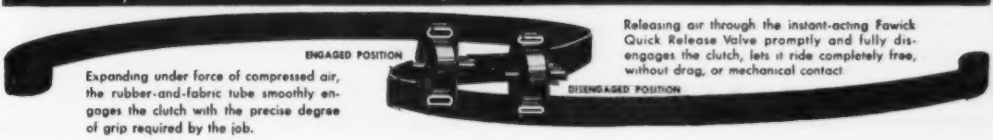
Fawick Airflex Clutch used on Suction Press Drive at Crane & Co., Inc., Dalton, Mass.

Time-wasting clutch adjustment down time is practically eliminated on Fawick-equipped machines. The moving parts of this Fawick Clutch—the rubber-and-fabric pneumatic tube and the friction shoe assemblies—adjust automatically and compensate for wear.

The smooth engagement action of this Fawick Clutch eliminates sudden shock loads which damage machinery. Controlled torque starting can be obtained with a simple modulating air valve. This type Fawick Clutch is ideally suited to continuous slip applications.

For specific recommendations for your machines, write to our Engineering Department today. Address Dept. PT.

Airflex



Expanding under force of compressed air, the rubber-and-fabric tube smoothly engages the clutch with the precise degree of grip required by the job.

Releasing air through the instant-acting Fawick Quick Release Valve promptly and fully disengages the clutch, lets it ride completely free, without drag, or mechanical contact.

This experimental paper-coating machine is part of the complete equipment in our Technical Service Laboratory for the development of coatings and aiding customers in the solution of specific problems.

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TO MACHINE-COATED PAPERS

WITH

TITANOX-RCHT

(RUTILE-CALCIUM PIGMENT)

● The trend to less weight and thinner coatings calls for improved opacity and brightness. TITANOX-RCHT imparts these qualities so necessary in assuring clear printing and vivid pictures as well as in minimizing "show-through."

As a result of this high opacity at reduced pigment cost, TITANOX-RCHT has advantageously taken the place of titanium-barium pigment. And in many cases proves attractive in comparison with straight titanium dioxide TITANOX-A-WD. For example, from practical tests, the average weight ratios of these pigments for equal opacity and brightness are indicated as follows:

TITANOX-A-WD	1
TITANOX-RCHT	2.5
titanium-barium	3

Our Technical Service Laboratory staff will be glad to discuss with you the choice of titanium pigment to best suit your needs. Call or write our nearest office. Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y.; 104 So. Michigan Ave., Chicago 3, Ill.; 2600 So. Eastern Ave., Los Angeles 22, Calif. Branches in all other principal cities.

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7340

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in Drums and Tank Cars
DU PONT PEROXIDES
FOR GROUNDWOOD BLEACHING

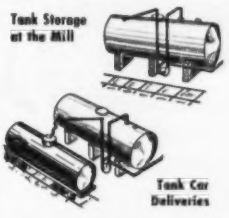
"ALBONE" 35
HYDROGEN PEROXIDE, 35%

"ALBONE" 50
HYDROGEN PEROXIDE, 50%

"SOLOZONE"
SODIUM PEROXIDE

For GREATEST ECONOMY, CONSIDER:

Tank Storage at the Mill



Tank Car Deliveries

If you need 5000 lbs. or more of "Albone" 35 Hydrogen Peroxide per month, you'll find a storage tank installation economical.

These high-quality Du Pont peroxides for groundwood bleaching are available in quantity . . . drums and tank cars. All three peroxides are highly stable under normal storage conditions.

Excellent and economical bleaching of groundwood can be carried out with either "Albone" or "Solozone" or a combination of "Albone" and "Solozone."

For valuable assistance with bleaching problems, the technical advice of the men who pioneered the development of groundwood bleaching is available. These Du Pont technical men will assist you in planning, installing, operating and maintaining a peroxide system for bleaching groundwood.

SEND FOR BOOKLET and other literature describing Groundwood Bleaching. Learn how easily the system can be set up and operated in your plant. Just clip the coupon below and mail it today.

DU PONT PEROXIDES

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BETTER THINGS FOR BETTER LIVING... THROUGH CHEMISTRY

CLIP THIS COUPON

E. I. du Pont de Nemours & Co. (Inc.)
Electrochemicals Dept., Wilmington 98, Delaware

Please send more information about Peroxide Bleaching of Groundwood.

*Name*_____

*Position*_____

*Firm*_____

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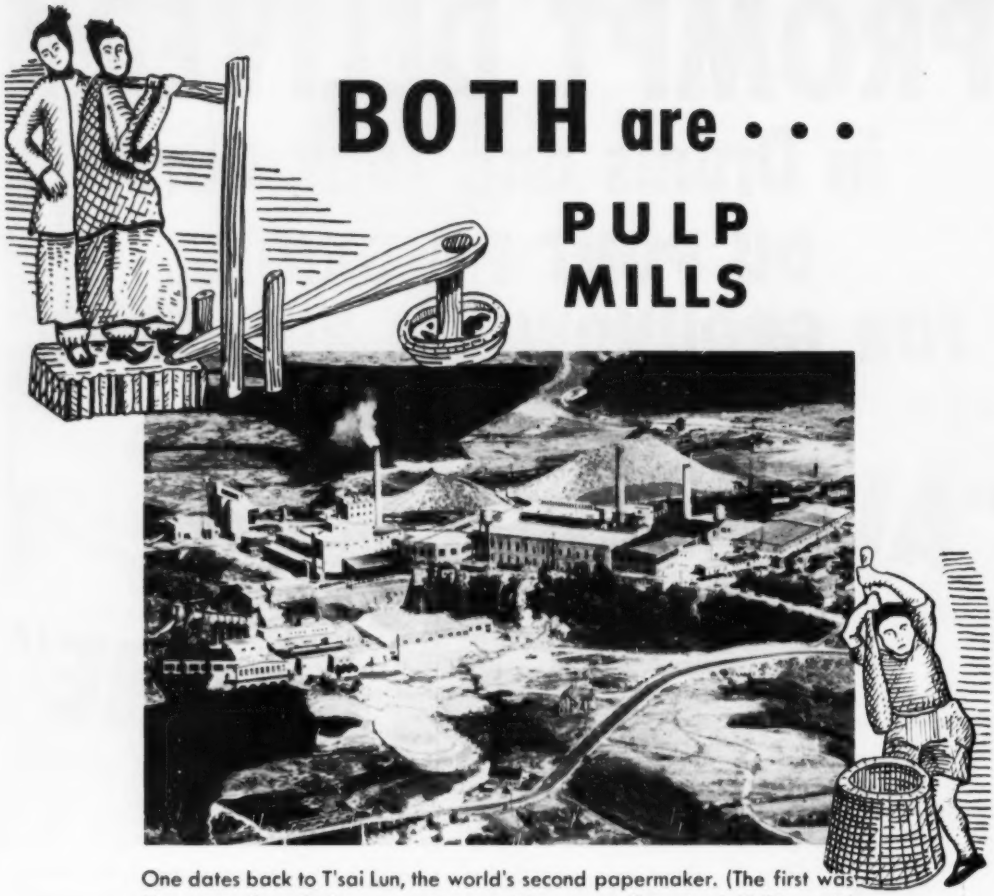
BOTH are . . .

PULP MILLS



One dates back to T'sai Lun, the world's second papermaker. (The first was *Vespa maculata,* the hornet, or papermaking wasp.) The other is KVP's model new mill at Espanola, Ontario - the last word in sulphate pulp mill construction.

KVP often called *The World's Model Paper Mill,* is the parent organization of the following plants, specializing in

FOOD PROTECTION and HOUSEHOLD PAPERS

Kalamazoo Vegetable Parchment Co.
Devon, Pennsylvania

Harvey Paper Products Co.
Sturgis, Michigan

KVP Company of Texas
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Appleford Paper Products Limited
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KVP Company Limited
Espanola, Ontario

KVP

KALAMAZOO VEGETABLE PARCHMENT COMPANY
PARCHMENT · MICHIGAN

RESINS AND CHEMICALS
FOR THE PAPER INDUSTRY

BACTERICIDES AND DEODORANTS

HYAMINE 1622 and HYAMINE 2389 are quaternary ammonium germicides and deodorants used to produce bacteriostatic papers and paper board.

REDUCING AGENTS

Sodium and zinc hydrosulfites and their corresponding sulfoxylate formaldehydes are extremely powerful reducing agents used to bleach groundwood pulp at moderate temperatures and at low cost. They are also used to bleach kraft and semi-chemical pulps, and to strip the color from rags.

ENZYMES FOR STARCH CONVERSION

RHOZYME BB and RHOZYME E-5 are enzymes used in very small quantities to modify starch so that it may be used in surface sizes, adhesives, and coatings.

WETTING, DETERGENT, DISPERSING, AND EMULSIFYING AGENTS

THE TRITONS are synthetic, organic, surface-active agents used:

- —to increase absorbency of towel stock
- —to process raw cotton and rags
- —to clean felts
- —to de-ink waste paper
- —to soften paper
- —to improve the penetration of resins, sizes and salts
- —to emulsify wax sizes, oily softening compounds, etc.
- —to wet and disperse pigments
- —to produce uniform coatings of glue on gummed paper and tape
- —to control foam

TAMOL N is the neutral sodium salt of a complex, condensed organic acid. It is an efficient and economical means of dispersing pitch, of increasing the retention of fines, of precipitating glue, and dispersing pigments and clays in coatings.

AMBERLITE W-1

A 20 percent aqueous solution of a polymer which produces marked improvement in both the wet and dry physical properties of paper. The resin solution may be diluted and sprayed on the wet web, or applied at the size press or calender stacks. It is an excellent film-former and pigment-binder and exhibits remarkable quick-tack.

WET STRENGTH RESINS

UFORMITE—Urea formaldehyde resins in liquid and powder form, infinitely dilutible by water. Improve wet strength as well as the dry tensile, Mullen, and fold and pick resistance of paper.

TO MAKE YOUR GOOD PAPER BETTER

CHEMICALS FOR INDUSTRY

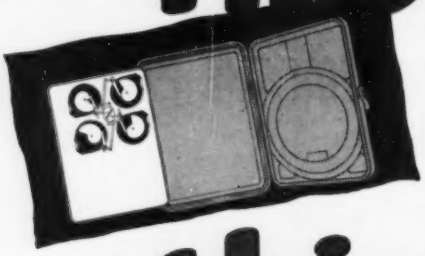
ROHM & HAAS COMPANY

THE RESINOUS PRODUCTS DIVISION

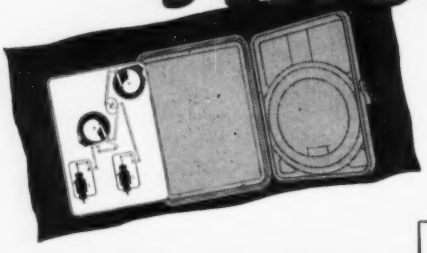
Washington Square Philadelphia 5, Pa.

The Resinous Products Division was formerly The Resinous Products & Chemical Company

you can have this



...or this



More than 100,000 different instrument combinations are now possible from four basic circuits and eight basic component parts. That's how Bailey has simplified electronic controls for processing industries.

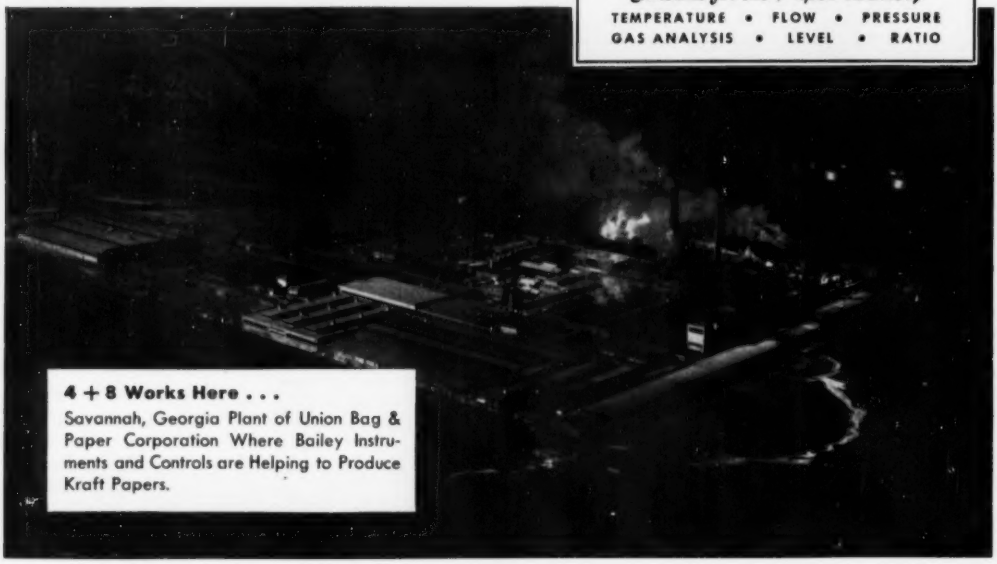
No matter what your process may be, you can use Bailey controls for flow, temperature, pressure, level, speed, gas analysis, pH, conductivity, etc. Four circuits and eight basic parts are all you need. You don't have to carry a large stock of replacement parts. Bailey parts are interchangeable. The units you use for one control can quickly be adapted to another.

To learn how Bailey controls can save you money and speed up control installations, write for a copy of Bailey Bulletin No. 17.

or 100,000 other instrument combinations
. . . with 4 circuits . . . 8 basic parts . . .

P-18-P

BAILEY METER COMPANY
1056 Ivanhoe Rd. • Cleveland 10, Ohio
BAILEY METER CO. LIMITED, MONTREAL
Controls for the Paper Industry
TEMPERATURE • FLOW • PRESSURE
GAS ANALYSIS • LEVEL • RATIO



4 + 8 Works Here . . .
Savannah, Georgia Plant of Union Bag & Paper Corporation Where Bailey Instruments and Controls are Helping to Produce Kraft Papers.

How Paracol®

can work for you

WAX AND WAX-RESIN EMULSIONS
FOR PAPER AND BOARD

IMPROVE SIZING
—*Insulating Board or Butchers' Wrapping Paper*

IMPROVE PRINTABILITY
—*Test Liner, Offset, and Book Papers*

INCREASE SLIP OR REDUCE SURFACE FRICTION
—*Lath Board, Test Liner, and Drinking Cup Stock*

LUBRICATE STARCH
—*Surface Applications*

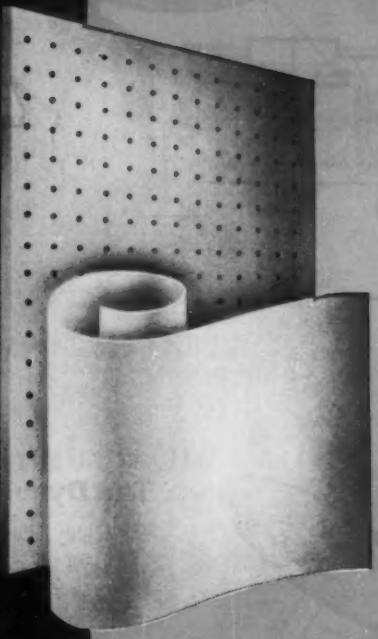
IMPROVE CREASING AND BENDING PROPERTIES
—*Envelope Stock*

SOFTEN THE SHEET
—*Tissue, Wrapping, and other Specialty Papers*

REDUCE CURL
—*Book and Printing Papers*

LAY FUZZ
—*Printing Paper*

*Only a few of the many applications for Paracol in paper and board are mentioned in this list.

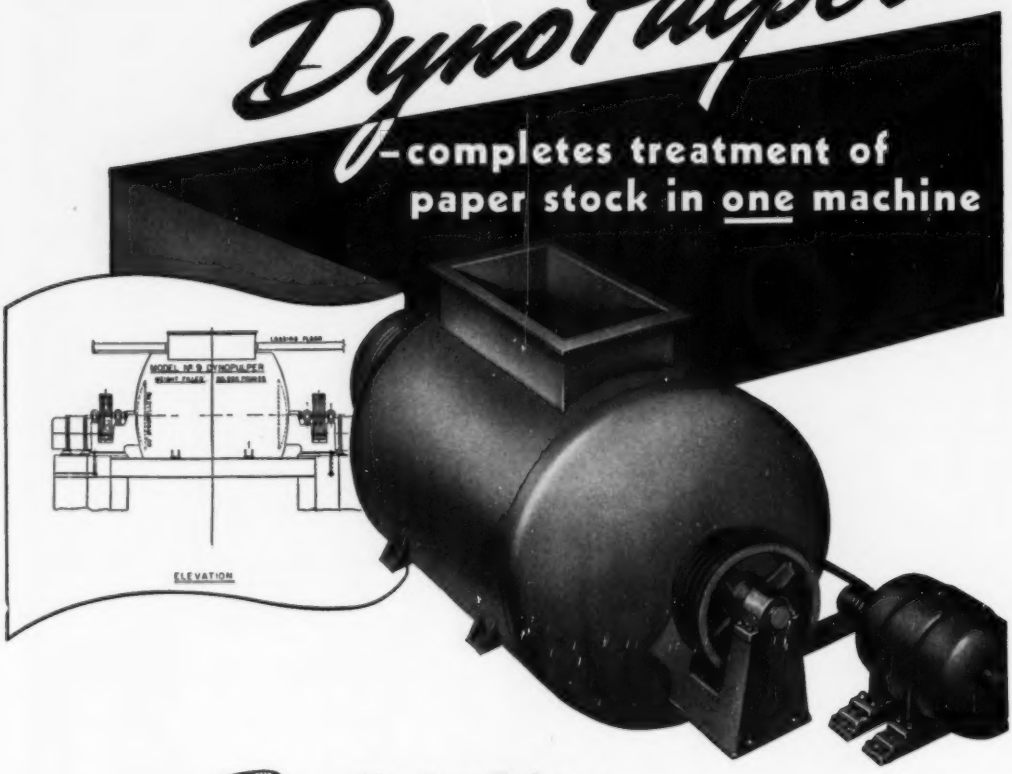


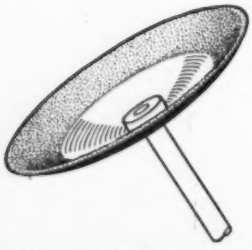
See how "Paracol" can help you.
For new descriptive folder, write to:
HERCULES POWDER COMPANY
INCORPORATED
962 King Street, Wilmington 99, Del.

HERCULES *SIZING MATERIALS AND CHEMICALS FOR PAPER*

Here's the new DynoPulper

—completes treatment of paper stock in one machine





The DynoPeller

is the heart of all DynoMachines. Its concave face is lined with rough, hard carbide particles. As the DynoPeller rotates it causes a suction at its center that pulls the stock towards it. Centrifugal force then causes the stock to flow rapidly over the rough carbide particles. This effective dynomizing action completely disintegrates the stock . . . separating each fibre from its neighbor while maintaining its original length.

The DynoPulper

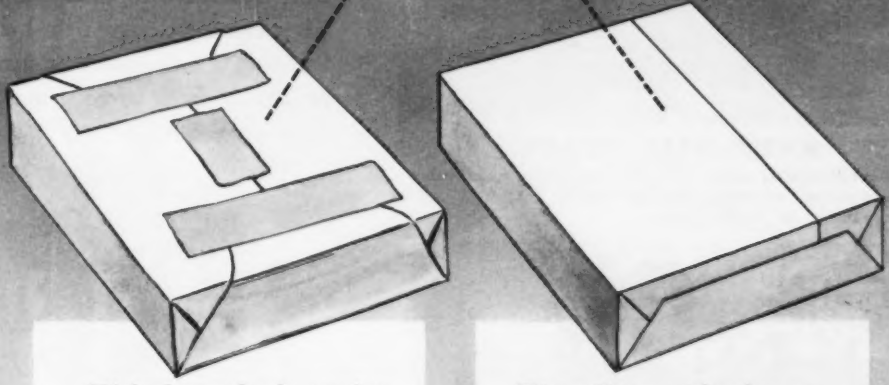
is a highly efficient machine for disintegrating pulp, waste paper or any type of stock. The stock is charged all at one time into the top of the horizontal circular vat. It is vigorously dynomized by two opposing DynoPellers—as described at the left. The fibres are quickly and completely separated . . . at surprisingly low cost.

The DynoPulper is used for either batch or continuous operation. Also available in laboratory sizes. Write for additional information.

RICE BARTON Research Corporation

WORCESTER 1, MASS.

WHICH
COSTS MORE TO WRAP?



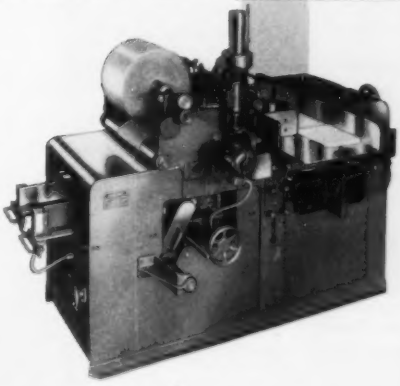
This hand wrapped package requires 7 girls to turn out 1,000 in an hour. There's a big waste of sealing tape on the package as well as paper on the end folds. Corners are not square, edges are not tight, spoiling its general appearance.

or

This machine wrapped package requires only one operator to turn out 1,000 packages per hour. There's no waste of sealing tape or paper because all edges are glue sealed. Corners are square, edges are tight, giving a neat appearance to the package.

Lynch MORPAC makes the difference!

The Lynch Morpac Paper Packaging Machine gives you not only greater packaging speed and neat appearing packages but pays for itself quickly on an average wrapping operation through savings as high as 40% on Kraft wrapper material. Designed primarily for the graphic arts, Lynch MORPAC wraps or bands ream paper, tablets and pads, books, groups of looseleaf fillers and most rectangular objects within its size range. Write today for illustrated folder giving complete details on the Lynch MORPAC Paper Packaging Machine.



PAR AIR COMPRESSORS

PAR REFRIGERATION COMPRESSORS

WRAP-O-MATIC CANDY & COOKIE WRAPPING MACHINES

LYNCH CORPORATION
PACKAGING MACHINE DIVISION
TOLEDO, OHIO

MORPAC PAPER PACKAGING MACHINES

MORPAC BUTTER & OLEO PACKAGING MACHINES

GLASS FORMING MACHINES

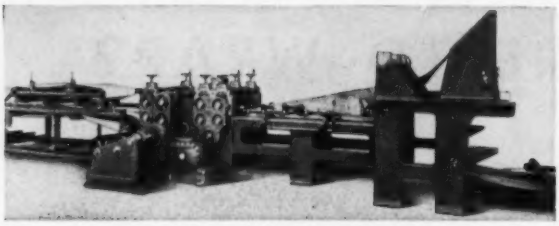
THE SMITH & WINCHESTER MFG. CO.

PAPER MILL AND PAPER BAG MACHINERY

Plant and Offices

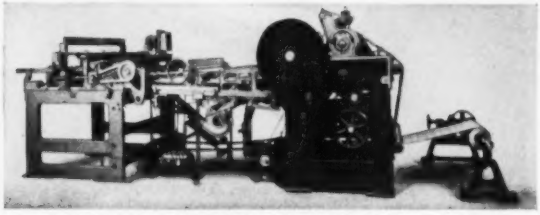
South Windham, Conn.

Modern, efficient machines for high-speed operation, large volume production and lower unit costs in the manufacture of paper and paper bags. Smith & Winchester equipment is custom-built to your specific requirements.



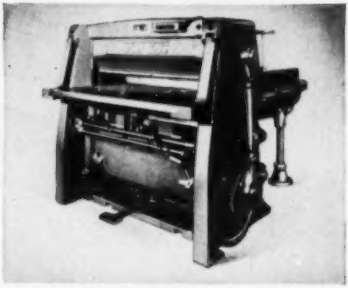
MULTI-WALL TUBER

For the production of single and multi-wall valve notch tubes for sewed valve type bags. Machine built in 2 sizes, 20" and 26" face; tubes, 26" to 50" long.



ROTARY SPOT CUTTER

Rotary Cutters for accurately handling large quantities of stock in finishing room. When equipped with patented photo-electric compensator, will accurately spot-cut pre-printed traveling webs. Built in 40", 50", 60", 71" and 83" widths. Layboy and stacker may be furnished.

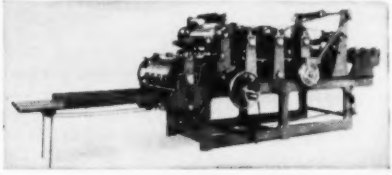


MODEL "E" UNDERCUT TRIMMER

The S & W Undercut is the only undercut trimmer made. The Model "E" is newly designed for fast, effortless, accurate cutting and safe operation. Retains the outstanding features of the S & W Standard Undercut with many new features added for greater safety, accuracy and flexibility. Built in 56", 66", 76", 86" and 96" widths.

SHOWER PIPES

The famous S & W "Rainstorm" Shower Pipe for greatest effectiveness and maximum economy.

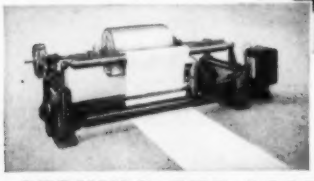


1/2 BBL BOTTOMER

S & W Bottomers are designed for high production and minimum spoilage with many new features for lowering bag production costs. Bottomers are made in several sizes. Produce standard satchel or narrow valve bottom.

WEB CONTROL

Fully automatic electric eye, side register control or web feed. Manual control can be supplied.



NO. 10 TYPE TUBER

For pasted bottom, multi-wall tubes. Used in connection with S & W Bottomers or producing standard satchel bottom or valve bag. Fully automatic or manual control for web feed.

Complete information on any of the above equipment on request.

SERVING THE PAPER AND PAPER BAG INDUSTRY SINCE 1828

Kidder Super-Speed Slitter with all-electric tension control. This control employs an electric motor operating as a generator in order to provide braking power for correct tensioning. Power generated is fed into main driving motor, thus cutting down on current consumption. Extremely accurate tension is maintained by this device.

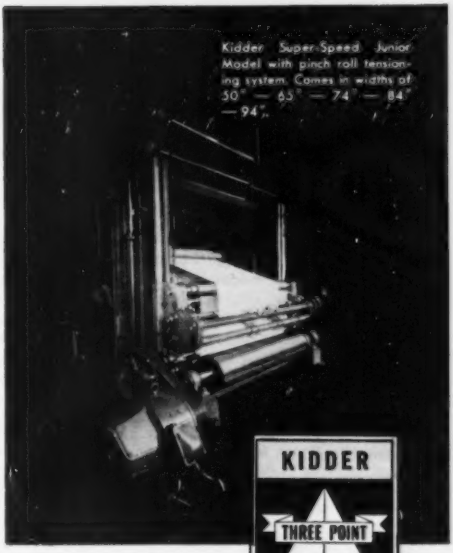
CONSISTENTLY CLEAN CUTTING

...at 2,000 FPM!

Kidder Super-Speed Slitters feature the famous "scissors-action" shear cut principle because no other type of cutter gives such clean cutting day after day on the job. No other cutter performs as well for "mile after mile" of cutting because the hardened steel cutters have a self-sharpening effect *as they cut*. The fibres are actually *severed*, not merely crushed apart as in other cutting methods. A special paper spreader opens up the slit directly after cutting, assuring complete severance of fibres before rewinding.

All these advantages are yours when a Kidder Super-Speed Slitter goes to work for YOU:

1. Choice of widths . . . 80" — 90" — 100" — 110" — 120".
2. Large roll capacity . . . takes mill roll and rewind roll up to 50" in diameter.
3. Optional tensioning equipment . . . standard equipment is efficient, water-cooled brake . . . automatic electric or pinch roll types available on option.
4. Automatic roll ejection . . . booster quickly ejects roll at end of run.
5. Soft ends and wrinkles corrected . . . by bow bar as web leaves mill roll.



Kidder Super-Speed Junior Model with pinch roll tensioning system. Comes in widths of 50" — 65" — 74" — 84" — 94".

KIDDER
THREE POINT
SLITTERS

give you
1. Clean, Accurate Cutting
2. High Speed, Dustless Operation
3. Easy Separation of Rolls

KIDDER PRESS COMPANY, INC.

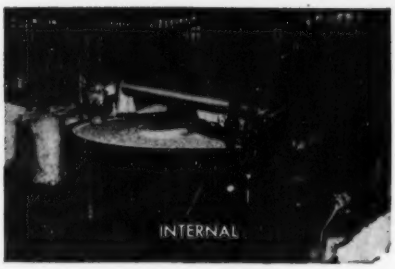
DOVER, NEW HAMPSHIRE

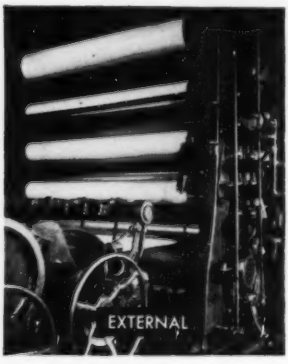
C. P. ROBINSON
Graybar Bldg., New York 17, N. Y.

MACHINERY SERVICE COMPANY
P. O. Box 33, Los Angeles 11, California

FOR ANY SIZE PROBLEM

NOPCO* WAX SIZES HAVE THE BEST ANSWER





Whatever type of paper, paper board or fiber board you produce, your sizing problems can be eliminated by using a Nopco-developed size . . . for regardless of which Nopco size you select, you'll find it easy to handle and an outstanding means of improving your products.

Nopco Wax Sizes, developed through exhaustive research, assure positive wax retention on the fibers—thorough and even wax migration through the sheet . . . high sizing efficiency at low sizing cost.

Examples are:

NOPCO 2252 — Ready-to-use Emulsion. A liquid paraffin wax size requiring no additive. Exceptionally efficient for internal application because of its fine particle size and alum sensitivity. Effective in all types of furnishes. When set on the fibers, it is totally inert—and therefore impervious to water conditions, temperature, or any of the common causes of size failure. In the manufacture of glassine, Nopco 2252 produces a slip-easy sheet of extremely satisfactory quality.

An ideal size for ***all*** mills with small requirements or limited facilities. Available in 55-gallon steel drums.

NOPCO 2251-X — Anhydrous Wax Size. A perfect balance of wax and emulsifier, enabling a stabilized emulsion to be produced ***spontaneously***, without rapid agitation. A creamy, waxlike solid, ***extremely easy to use.*** Gives exceptionally uniform size. Lowers cost of size preparation, and effects substantial freight savings over finished emulsion types. Available in 70-lb. cartons.

NOPCO 2251-B — Anhydrous Emulsifier. Two parts of Nopco 2251-B emulsify five parts of scale wax, to produce very stable emulsions that may be used either in paper stock sizing or calender sizing operations. Because of the small particle size (½ micron), and the fact that it is precipitated by alum—resulting in excellent retention by the fiber—Nopco 2251-B is one of the most efficient products available for internal (beater) sizing. Assures consistently uniform sizing at low cost. A light tan solid packed in 70-lb. cartons.

AND REMEMBER, back of all Nopco Paper Chemicals stands Nopco Technical Service—ready to give prompt attention to all requests and inquiries; assist you with laboratory data, and recommendations based upon your specific requirements.

Ask your Nopco representative for full details, or write today for complete information.

*Reg. U. S. Pat. Off.

NOPCO CHEMICAL COMPANY, Harrison, N. J.

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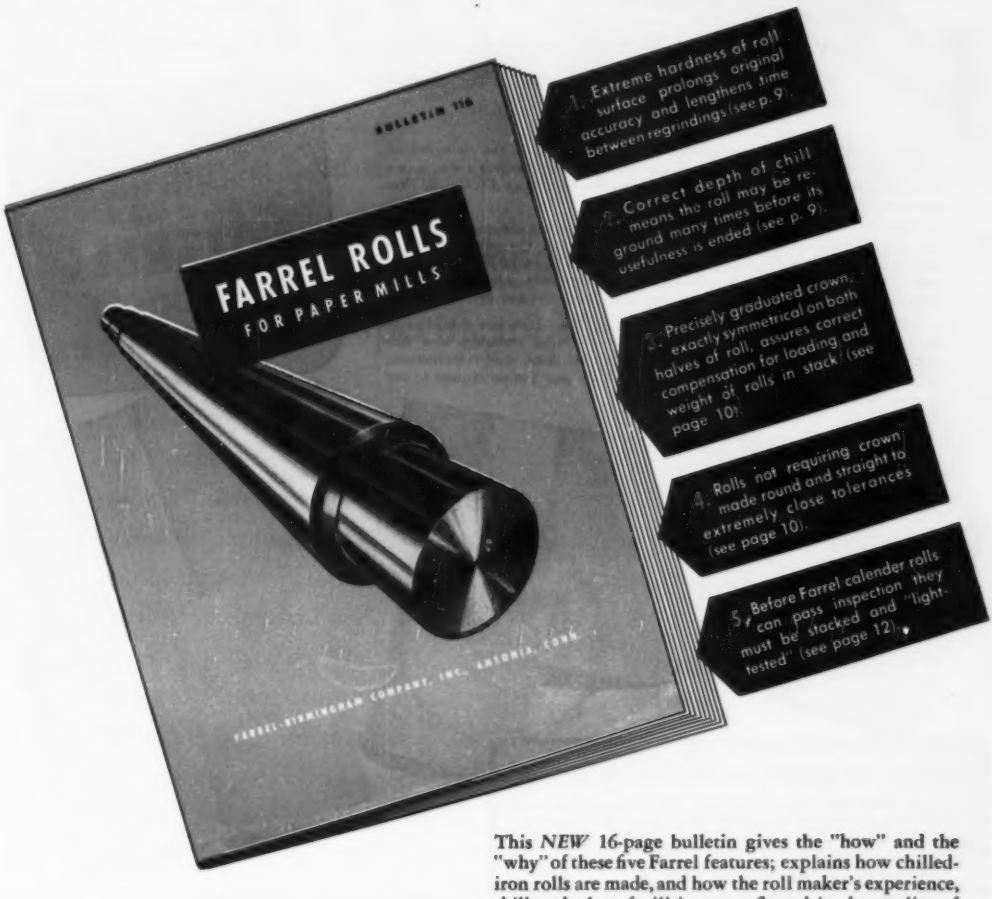
NOPCO TRADEMARK EVOLVED THRU RESEARCH

5 GOOD REASONS . . .

why you should specify FARREL CALENDER ROLLS


BULLETIN 116
FARREL ROLLS
FOR PAPER MILLS
FARREL-BIRMINGHAM COMPANY, INC., ANSONIA, CONN.
1. Extreme hardness of roll surface prolongs original accuracy and lengthens time between regrindings (see p. 9).
2. Correct depth of chill means the roll may be re-ground many times before its usefulness is ended (see p. 9).
3. Precisely graduated crown, exactly symmetrical on both halves of roll, assures correct compensation for loading and weight of rolls in stack (see page 10).
4. Rolls not requiring crown made round and straight to extremely close tolerances (see page 10).
5. Before Farrel calender rolls can pass inspection they must be stacked and "light-tested" (see page 12).

This *NEW* 16-page bulletin gives the "how" and the "why" of these five Farrel features; explains how chilled-iron rolls are made, and how the roll maker's experience, skill and plant facilities are reflected in the quality of the finished product.

Farrel calender rolls are made in the *world's largest specialty roll shop*—a shop that has been serving the paper industry for close to a century.

FARREL-BIRMINGHAM COMPANY, INC. • ANSONIA, CONNECTICUT

Plants: Ansonia and Derby, Conn., Buffalo, N. Y.
Sales Offices: Ansonia, Buffalo, New York, Pittsburgh, Akron, Chicago, Los Angeles, Houston

FARREL-BIRMINGHAM COMPANY, INC., ANSONIA, CONN.

Please send me a copy of your new bulletin 116, "FARREL ROLLS FOR PAPER MILLS".

Name_____ Title_____

Company_____

Address_____

City_____ State_____

FB-561

Before you order calender rolls, send for a copy of Bulletin 116. Just fill out the coupon and mail it today. No obligation.

Farrel-Birmingham

FREE

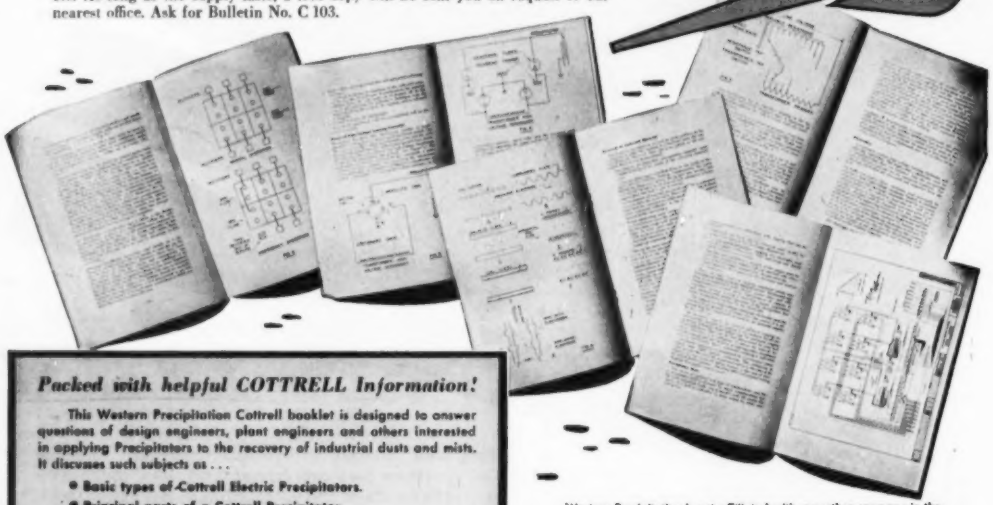
From Western Precipitation—the organization that pioneered the commercial application of Cottrell Precipitation...

IF YOU ARE ENGAGED in any phase of industry where the recovery of dusts, fumes, fly ash, mists, fogs or other suspensions from gases is a problem, you will find this booklet on the COTTRELL Electrical Precipitator helpful and informative.

Western Precipitation pioneered and installed the first commercial application of the well-known COTTRELL Electric Precipitator—Dr. Cottrell, the inventor, being a member of the company. And for more than 42 years Western Precipitation has consistently led in developing new COTTRELL advancements and techniques for recovering suspensions from gases, both wet and dry.

This 28 page booklet summarizes many of the basic facts you should know about modern COTTRELL Precipitators—the various types available, how they operate, principal types of electrode systems and rectifiers, shell constructions, etc. As long as the supply lasts, a free copy will be sent you on request to our nearest office. Ask for Bulletin No. C 103.

28 PAGES
of helpful facts to know about
COTTRELL ELECTRICAL PRECIPITATORS



Packed with helpful COTTRELL Information!

This Western Precipitation Cottrell booklet is designed to answer questions of design engineers, plant engineers and others interested in applying Precipitators to the recovery of industrial dusts and mists. It discusses such subjects as...

- **Basic types of Cottrell Electric Precipitators.**
- **Principal parts of a Cottrell Precipitator.**
- **Mechanical and Electronic Rectifiers.**
- **Various types of Collecting Electrodes (rod curtains, corrugated plates, dual plates, pocket electrodes, etc.).**
- **Removal of Collected Material.**
- **Factors in Shell Construction (steel, concrete, brick, etc.).**
- **Operating Efficiencies and the Effect of Various Factors on Performance.**

...and many other basic Cottrell facts. Write for your free copy of Bulletin C103 today while supplies are adequate!

Western Precipitation is not affiliated with any other company in the field of electrical precipitation except its wholly owned subsidiaries, International Precipitation Corporation and the Precipitation Company of Canada, Ltd. Whether you are now contemplating the installation of a Cottrell Electrical Precipitator, or may be interested in such an installation at a future date, we can and will serve you in any part of the United States or other countries.

NOW SELLING

COTTRELL Precipitators
MULTICLONE Collectors
TURBULAIRE Spray Dryers

...in all parts of the U. S. A. and foreign countries.

WESTERN Precipitation CORPORATION

ENGINEERS, DESIGNERS & MANUFACTURERS OF EQUIPMENT FOR COLLECTION OF SUSPENDED MATERIALS FROM GASES & LIQUIDS

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PRECIPITATION CO. OF CANADA, LTD., DOMINION SQ. BLDG., MONTREAL

SOLKA®

offers you a *complete* range of highly purified "extreme-specification" wood fibres

SOLKA is the trade name of a complete range of highly purified Brown Company pulps which possess carefully graduated chemical and physical properties. The Solka pulps are designed to satisfy the unusual requirements of papers specifically engineered for particular qualities such as maximum durability — extreme softness, etc.

The eight grades of SOLKA pulp include soft wood and hard wood fibres — sulphate and sulphite pulps and offer the widest range of chemical and physical properties to the manufacturer faced with unusual paper problems.

Our technical service department is always at your service for the development of special furnishes to meet particular paper problems.

BROWN COMPANY

FOREMOST PRODUCERS QUALITY PURIFIED CELLULOSE

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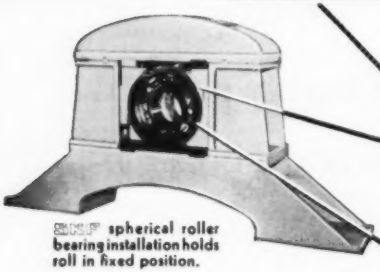
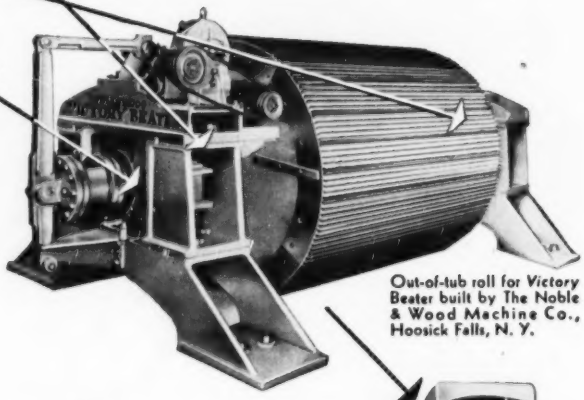
SKF rocker mount design permits timed oscillation for continuous honing effect on the bars.

NOBLE & WOOD VICTORY BEATER USES SKF BEARINGS FOR EFFICIENT, POWER-SAVING PERFORMANCE



SKF spherical roller bearing installation holds roll in fixed position.



- self-alignment
- high shock load capacity
- original setting maintained during oscillation

Out-of-tub roll for *Victory* Beater built by The Noble & Wood Machine Co., Hoosick Falls, N. Y.

Backed by years of pioneering in the paper field, SKF bearings feel "right at home" on the Noble & Wood *Victory* Beater. This modern beater operates with controlled flow—the roll is out of the tub and does not have to mix and circulate the stock, thus requiring less power.

The roll of the beater is mounted in an elevated position and held firm by SKF spherical roller bearings. With their high load capacity and radial rigidity, SKF bearings are ideal for beater applications. The absence of any appreciable bearing wear permits close settings between the beater roll and the bed plate. The Noble & Wood beater also features another version of the SKF rocker mount design, which permits timed oscillation of the roll, with maintained location of the roll center.

More and more manufacturers are incorporating SKF technical skill and know-how into their paper equipment designs. Whether it's Beaters, Chippers, Jordans, or Fourdriniers, SKF engineers can help you put the right bearing in the right place. Write to: SKF Industries, Inc., Philadelphia 32, Pa. 6609

Paper Equipment Bearings engineered by SKF

Where are your new markets for softer paper products made like this ?

You can make them better and at lower cost with Du Pont Sulfamic Acid*

EVERY DAY, new markets for softened paper and paper products are coming to light. A few of them are shown here. Probably you can think of many more. And today, you can make the paper that will *sell* these markets—easily and economically—with Du Pont Sulfamic Acid.

Just add Sulfamic Acid to the desired amine to get an Amine Sulfamate that softens your paper and also adds a high degree of *fire resistance*—with a single treatment.

BETTER SOFTENING is assured at *all* humidities because Amine Sulfamates do not depend entirely on water pick-up. Paper treated with an Amine Sulfamate retains its softness even after long periods of normal use. And it can be readily printed or glued.

EXTREME YELLOWING RESISTANCE can be easily obtained with a simple modification of the Amine Sulfamate.

LOW-COST... EASILY APPLIED! Du Pont Sulfamic Acid is inexpensive. Added to amines, it can be economically and uniformly applied by immersion or spray.

Where fire resistance without softening is required, the regular Du Pont Fire Retardants are recommended.

TO HELP YOU take advantage of this new development, Du Pont technical assistance is readily available. Just clip the coupon for our samples and technical bulletin on Sulfamic Acid.

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SULFAMIC ACID

*The basic material in making Amine Sulfamates

BETTER THINGS FOR BETTER LIVING... THROUGH CHEMISTRY

E. I. du Pont de Nemours & Co. (Inc.)
Grasselli Chemicals Dept., Room 4069 B
Du Pont Bldg., Wilmington 98, Delaware

Please send me Technical Bulletin on Sulfamic Acid.

Name_____ Title_____

Company_____

Address_____

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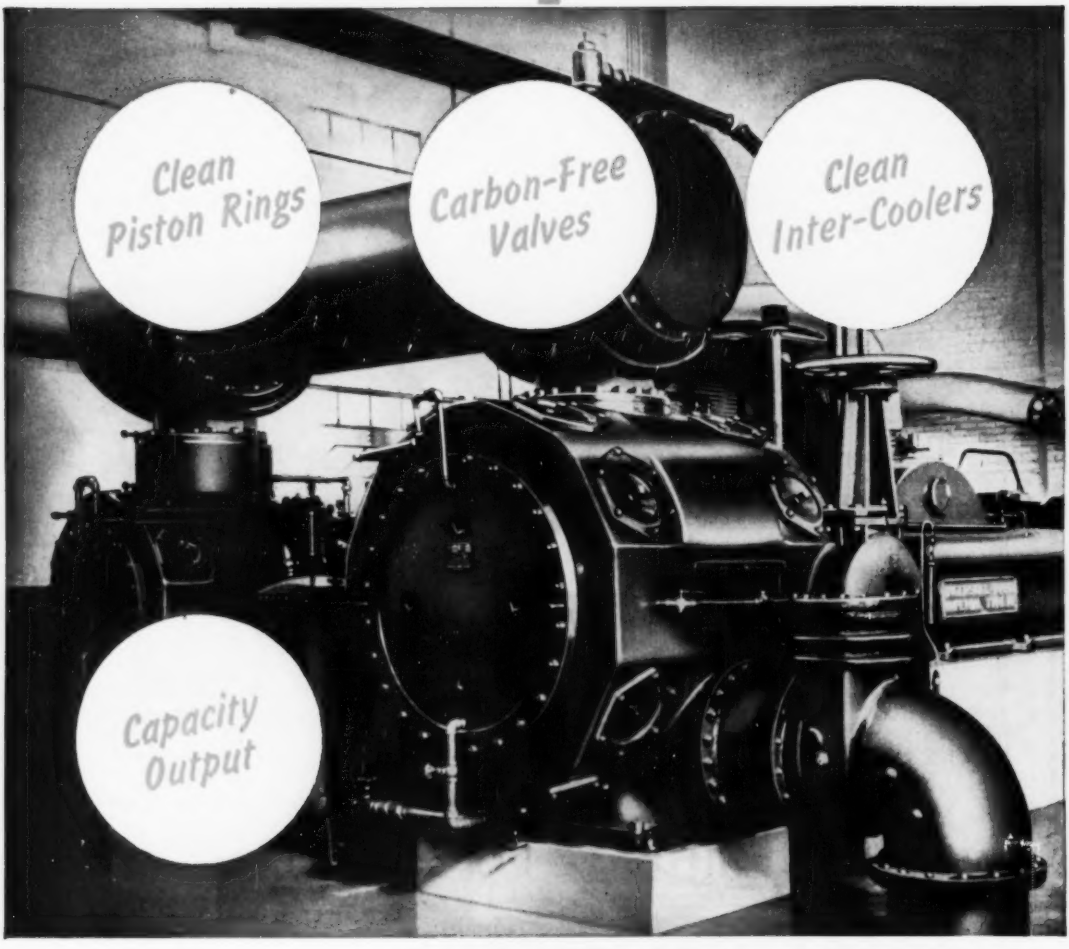
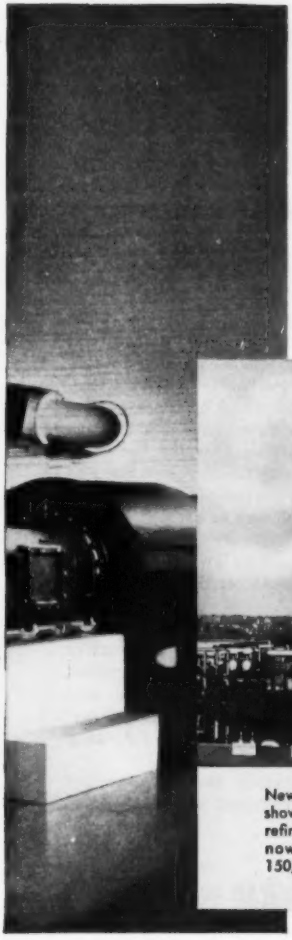
TROUBLE-FREE
Under Any Pressure



SINCLAIR

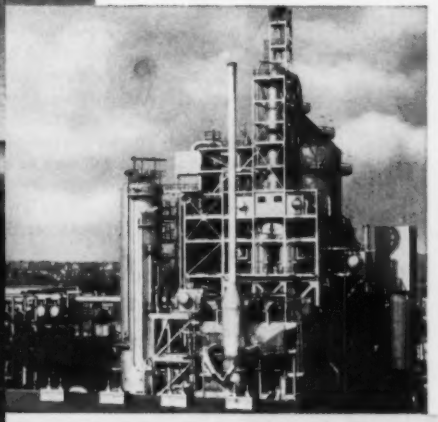
YOUR NEAREST SUPPLIER OF SINCLAIR PRODUCTS WILL GLADLY ARRANGE

Compressor Operation with Sinclair Rubilene



In many industries positive supply of air is a vital necessity . . . which means that reliable compressor performance is imperative.

With Sinclair RUBILENE, an operator can be confident of uninterrupted performance. RUBILENE has the ability to resist oxidation under high temperatures, to reduce carbon and sludging and to keep sustained lubricating quality through long service. It assures full capacity output by keeping valves and rings clean and free. For positive lubrication, better try RUBILENE.



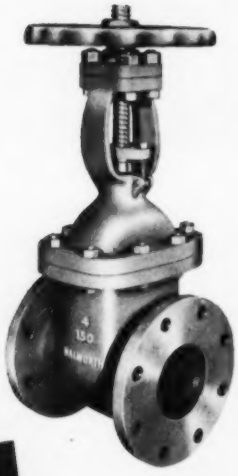
New Fluid Catalytic Cracking Stills (like the one shown here) are helping to expand Sinclair's refinery output. Sinclair's great refineries are now turning out products at the rate of 150,000,000 gallons of lubricating oil yearly.

About 40% of all the Aircraft Engine Oil used by domestic Airlines in the U.S.A. is supplied by SINCLAIR. The same careful research that developed this high quality oil for the Airlines is put into RUBILENE and other Sinclair Oils.

INDUSTRIAL OILS

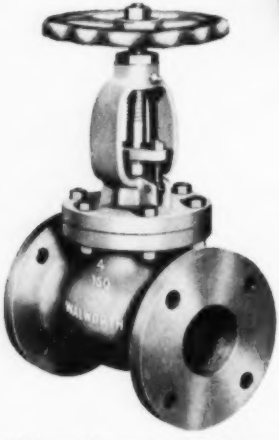
FOR LUBRICATION COUNSEL, OR YOU MAY WRITE TO SINCLAIR REFINING COMPANY, 630 FIFTH AVE., NEW YORK 20, N. Y.

Newly Designed Walworth Valves to combat corrosion



Walworth 150-pound Stainless Steel Gate Valve . . . available in sizes ½ to 3-inch, screwed; ½ to 12-inch, flanged.

Made of Stainless Steel
Monel · Nickel
Acid-resisting Bronze
Ni-resist



Walworth 150-pound Stainless Steel Globe Valve . . . available in sizes ½ to 3-inch, screwed; ½ to 6-inch, flanged.

Sectional view of Walworth 300-pound Stainless Steel Gate Valve . . . available in sizes 2 to 6-inch, flanged.

— ENGINEERED AND TESTED FOR TOUGH . . . HARD SERVICE

Walworth offers a comprehensive line of valves made of several cast stainless steels and special alloys for piping services where corrosion is a factor. These valves are available in Gate, Globe, Angle, Check, and Lubricated Plug types.

Gate, Globe and Angle Valves have outside screw and yoke construction, thus keeping the stem threads out of contact with the corrosive material in the line. They also have a two-piece bolted gland with ball-type gland follower to prevent binding the stem when packing bolts are tightened. Gland eye-bolts can be conveniently swung out of the way without danger of loss when the gland is lifted for repacking.

Gate Valves have taper seats with a unit consisting of two flat faced discs supported by a carrier on the end of the stem. The discs are of a proven ball-and-socket type. They are free to rotate and adjust themselves to the body seat angles, assuring tight seating with no possibility of sticking in any position.

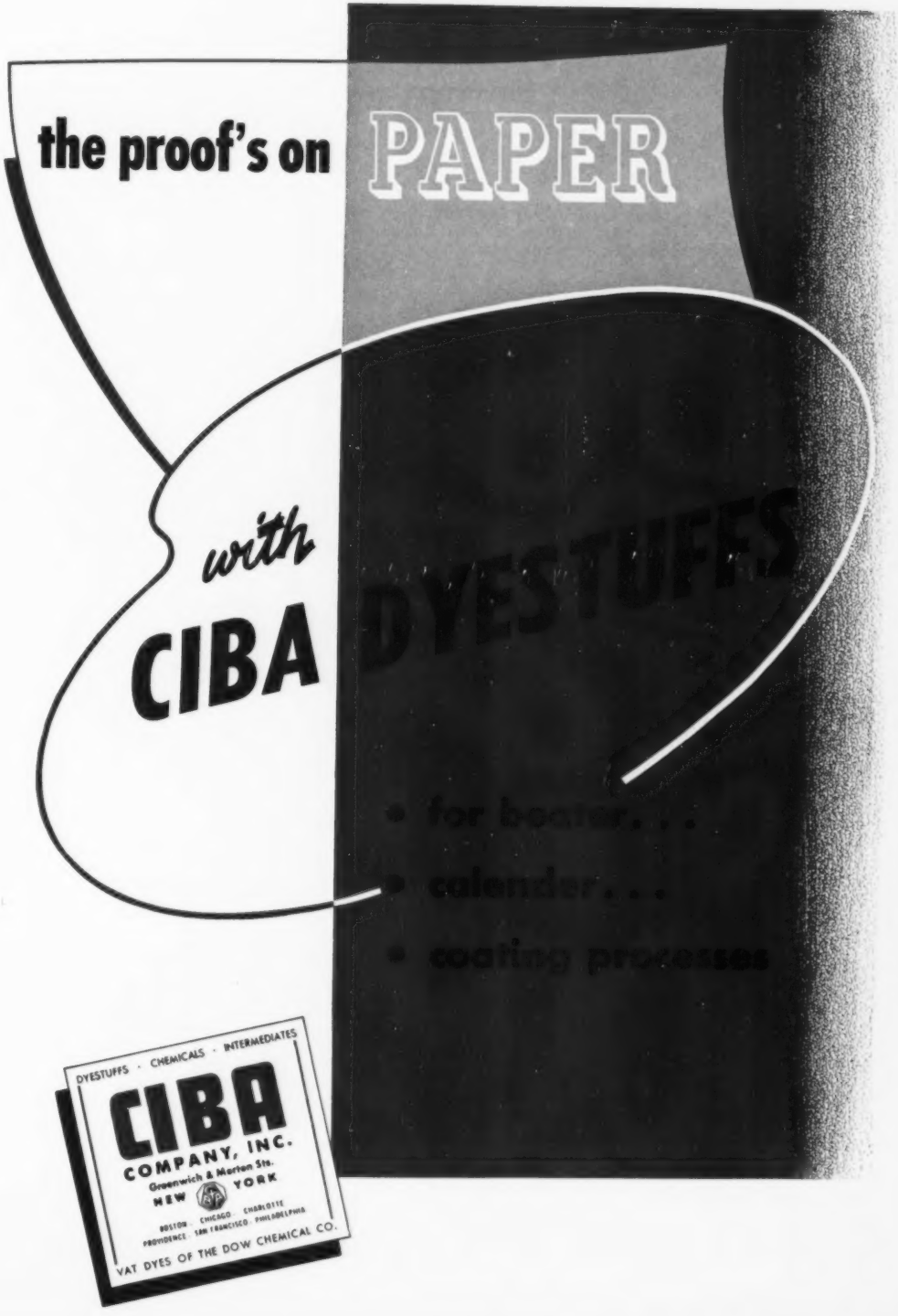
For further information about Walworth's full line of corrosion-resistant valves, see your Walworth distributor.

WALWORTH

valves and fittings

60 EAST 42nd STREET, NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD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New

MOORE & WHITE Rotary Steam Joint

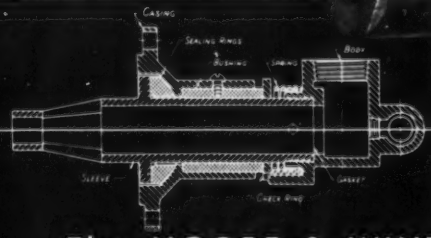
weighs only 12 pounds!

This improved, extra-light Rotary Steam Joint is expertly engineered and precision-built. Low in cost, it will give years and years of satisfactory service. It is made from a special aluminum alloy, treated to Moore & White specifications, and weighs only 12 pounds—as compared with the conventional joint weighing up to 90 pounds. No supports are necessary. It is simple in construction—extremely easy to handle and install. Just bolt it to the end of the dryer journal and make the necessary connections.

The Moore & White Rotary Steam Joint needs no lubrication. Graphite bushings are held in place by screws designed to prevent binding of the sleeve. This assures a steam-tight fit, and eliminates leakage. The joint is made to withstand up to 400 pounds test pressure, several times the maximum pressure used.

Call or write us for further information concerning this major Moore & White contribution to paper-making efficiency. If you desire an estimate, please supply the following data:

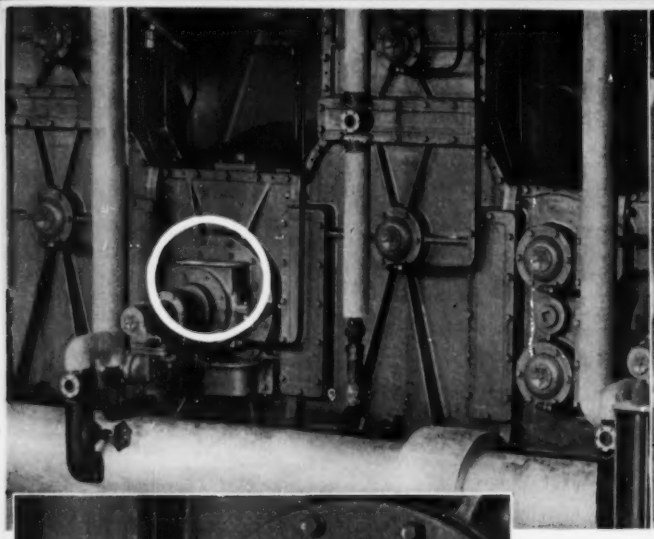
1: **Diameter of end of dryer journal.** ***2:*** **Diameter of hole in journal.** ***3:*** **Bolt circle and size of bolts.** ***4:*** **Diameter of steam inlet.** ***5:*** **Diameter of exhaust pipe.** ***6:*** **Size of siphon pipe.**

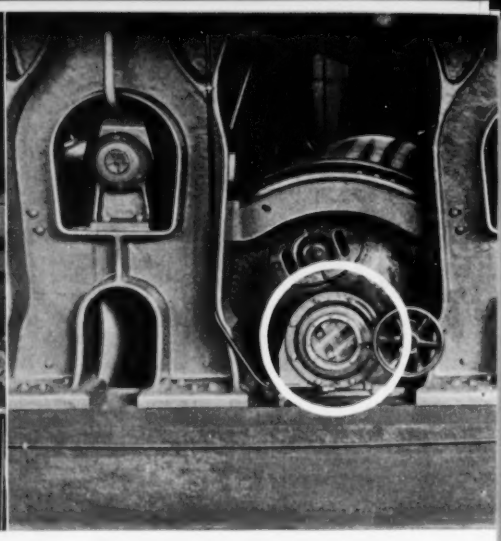


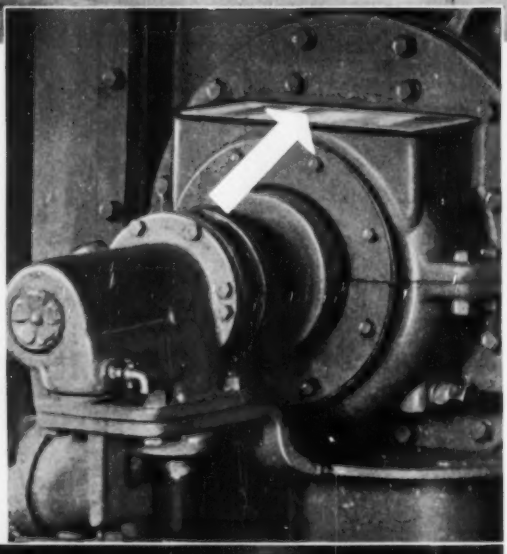
The MOORE & WHITE Company

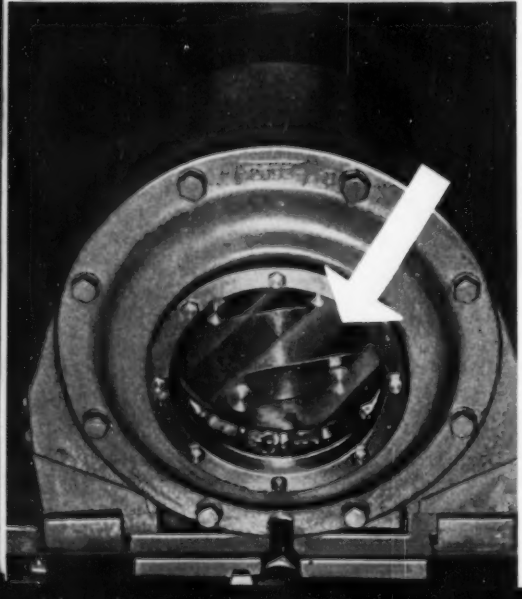
15TH STREET AND LEHIGH AVENUE PHILADELPHIA 32, PA.

CUSTOM-BUILT MACHINES FOR MAKERS OF PAPER AND PAPERBOARD









THESE WINDOWS LET YOU SEE THE BEARINGS WORK

You don't have to "guess" about oil flow or bearing performance in the new Puseyjones Machines.

Here are lucite windows which allow you to observe the flow of oil and the condition of the bearings *without dismantling*. Save time. Help to avoid breakdowns.

When it becomes necessary to remove the bearings on the dryer journals in the new Puseyjones Machines, you can forget cumbersome screw jack pullers. A high-pressure hand pump builds up the oil pressure under each of the bearings and literally forces it off.

With design improvements and labor-saving devices like those described above, no wonder we are proud of the latest Puseyjones Machines. The Paper Industry has set production records on Puseyjones Machines for three generations. Our engineers will gladly show you why.

THE PUSEY AND JONES CORPORATION
Established 1848. Builders of Paper-Making Machinery
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THE SIGN OF TRADE MARK SUPERIOR QUALITY

Paper TRADE JOURNAL

TRENDS

Office of the PAPER TRADE JOURNAL, Wednesday, November 16, 1949.

Pulp Market Trends

At the halfway mark in the year's fourth quarter, the shape of wood pulp prices to come is usually sufficiently clear to be recognizable. Because of the over- and undertones which the Swedish market situation has contributed in the eight weeks since devaluation, it is extremely difficult to appraise current events for a trend.

Basically, the demand for pulp—the controlling factor of the market—looks likely to be sustained at present levels for the first quarter of 1950 at least. In every market of the paper and paperboard industry, reports indicate that demand is strong for immediate needs, that inventory rebuilding has scarcely started, that backlogs are growing, the mills operating at high capacity, and that the prospects are increasingly bright.

To meet the pulp demands of such a market, bleached grades of domestic, Canadian and Scandinavian supply are seen as adequate-to-tight, with demand for book and business papers increasingly heavy. Early reports that new bleached sulfite tonnages would appear in the spring are now clarified. A higher type of the unbleached sulfite will be marketed, not a bleached grade. Swedish mills are reported to be converting considerable rayon capacity to paper grades to meet U.S. market demands. Prices on the bleached grades are likely to strengthen.

Ample Supply of Unbleacheds

By the same token—providing for basic paper and paperboard demand, the unbleached grades will be wanted at current levels, at least. No southern kraft market pulp is expected to be available since producers will need for own use. Of the northern krafts, there are three Canadian grades of varying qualities, quoted at $82.50, $97.50, and $105 delivered. Sizable tonnages of the lower grade are said to be available.

Swedish and Finnish producers also have large quantities of highgrade unbleached krafts; and the sum total of Canadian and Scandinavian supplies is more than the U.S. market requires. Thus while the price of $82.50 is the low which producers want to hold, there has been competitive selling when large tonnage orders are in the balance. It could be truly said that one definite American reaction to the post-devaluation sales of Swedish unbleacheds at low prices is that domestic producers have fortified themselves against repeat offers with competitive prices, grade by grade. *Reliable sources indicate, however, that no more of these pulps will be offered this year; the mills are about sold up for last open water.*

Still another element in this competition is the edge which devaluation has given Scandinavian producers. While they obviously would like to sell their pulp at quoted dollar prices to get the full measure of the devalued currencies in more profitable sales and production, their wish is tempered by the reality of keeping their U.S. markets, even at the risk of some further losses. And while it is true that British and other Continental markets will increasingly draw on the Scandinavian supply because of their dollar shortages, it is expected that there also will be undiminished effort on the part of the Swedes, Finns and Norwegians to sell to the U.S. mills. Their governments need dollars; the producers want a foothold in this market.

This conclusion therefore is pointed up: there will be competitive selling on large tonnages of unbleached krafts with perhaps a $2.50 to $5 adjustment seen in first-quarter, 1950, quotations. Intensity of the competition will lessen as British and Continental markets open up further, at higher prices and with lesser freight costs.

Unbleached Sulfites

Competitive selling also is reported on North American and Scandinavian unbleached sulfites on tonnages wanted in excess of contracted requirements. What has been said of the over-supply of unbleached krafts is in a measure true also of unbleached sulfites; for while it is reported that the domestic mills are selling all of their production, it is a known fact that they would like to increase the production ratio to a more profitable basis.

Introduction of the new grade of unbleached domestic sulfite sometime in the Spring is expected to siphon off some of the purchasing of unbleached sulfites now going to Europe. Meanwhile there is a bid between North American and Scandinavian producers for extra large tonnages, and competition is reported to be keen. Scandinavian quotations are reported to be "on dock."

Pressure from Scandinavian grades will probably ease as Continental demands for those pulps increase, the production of these countries—particularly Sweden—being limited to the yield of their forests which were so greatly overcut during war years.

There are grades of Scandinavian unbleached sulfites which are needed by U.S. consuming mills. That market looks assured.

Because of the potential production capacity at domestic and Canadian mills which are now operating too close to the break-even point, plus the anxiety of Scandinavian producers to keep a market here, there is likely to be competitive selling for large tonnages of unbleached sulfites for the balance of this quarter, with the possibility of a $2.50 to $5 price adjustment for the first quarter of 1950.

Market Undertone Strong

But for these two adjustments which now seem inevitable in view of the confused world currency situation, the market is strong and likely to show upward gains later in 1950 if demand accelerates, and as the Scandinavian supply is channeled elsewhere. It is stated that there will be no further price reductions, that bottom levels have been reached.

Russian Pulps Seek Market

Reliable sources indicate that good quality Russian pulps were offered to U.S. dealers: 20,000 short tons of Arkangel kraft at $65 on dock, and 20,000 short tons of Kaliningrad, half-soft sulfite. So far as can be learned, there were "no takers," the market conditions on these grades being such that new supply could not be absorbed.

Waste Paper Consumption Grows

Consumption of waste paper in October was about as good as the previous postwar years, the ECC reports.

If consumption continues at the present rate for the balance of the year, waste paper consumption for 1949 will be between 14 and 15 percent behind consumption for all of last year. Consumption for November also started well with demand for the high-grades sustained at a better level than at any time since the end of the war. Mills are carrying fairly substantial inventories, and are consuming more than ever before. Ledgers also are in good demand.

On *mixed*, old corrugated and No. 1 news conditions vary by areas. The Chicago market is strongest of all areas, with prices higher on all grades.

Production Indexes

Ratio of production of unbleached kraft paper to potential mill capacity for that product was 91.8 percent for the week ended November 5, compared with 86.7 percent for the preceding week, and with 98.3 for the corresponding week of last year.

Comparative ratios of U.S., paper and paperboard production to mill capacity, as reported by AP&PA, are:

	Nov. 5 1949	Oct. 29 1949	Nov. 6 1948	Nov. 8 1947	Nov. 9 1946
Paper	99.0	‡98.5	98.1	108.9	106.8
Paperboard	92.0	94.0	95.0	102.0	102.0

‡ Revised.

Paperboard Production (Tons)*

	Nov. 5 1949	Oct. 29 1949	Nov. 6 1948
Production	203,035	203,786	189,639
New Orders	375,815	193,527	244,488
Unfilled Orders	469,423	400,589	419,248

Percent of Activity, Current, 92%; Year, 81%.
* Source: N.P.A.

General Business Indexes

Index of general business activity for the week ended November 5 inclined to 123.6 from 122.6 in the preceding week, compared with 152.4 in the corresponding week of 1948.

Paper TRADE JOURNAL

News of the Week

MILLS

Pacific Paper Mills to Expand

BILLINGHAM, Wash.—F. J. Herb, president and general manager of Pacific Coast Paper Mills, Inc., reports that current expansion jobs "are to be the second step to which was termed a $750,000 expansion program.

"Despite the fact that we are now operating our plant at full capacity," Mr. Herb said, "production of MD facial tissue continues to lag behind orders, and the demand for the product is constantly increasing."

Herb added that specialized papermaking equipment made especially for the production of the local industry's principal product, facial quality tissue, has been ordered.

"Additions to buildings and other facilities will begin at once," he added, "in preparation for this additional machinery."

Howard S. Wright & Co., building contractors, is to be in charge of the expansion construction, which is expected to be completed within the next six months.

Taylor Heading Virginia Operations

BIG ISLAND, Va.—Aubrey T. Taylor, recently elected vice-president of the National Container Corp. of Virginia, the Virginia subsidiary of the National family, has been appointed plant manager of the Big Island Mill and placed in charge of all Virginia operations of the company. Mr. Taylor has been associated with the Big Island operation for many years, having come to Big Island in 1937, and since National Container Corporation took over the old Bedford Pulp and Paper Company plant in 1944, has been general superintendent of that mill.

Mr. Taylor's many friends in the industry and in Big Island, Bedford and Lynchburg, will be glad to learn of his advancement.

Johnson Chief Industrial Engineer

MIDDLETOWN, Ohio—Two changes in the manufacturing management organization of the Gardner Board & Carton Co., are reported by Colin Gardner, III, operations manager.

William R. Johnson of Manhasset, L. I., has been appointed chief industrial engineer succeeding George I. Brown of Wyoming.

Mr. Johnson joined the Gardner organization on September 19, and has been familiarizing himself with manufacturing operations and techniques of the paper industry since that time. Immediately prior to coming to Middletown, he was manager of the New York branch of the American Bosch Corp. Previously he was assistant to the vice-president in charge of manufacturing, and manager of the standards department for the same company. From 1934 to 1944 Mr. Johnson served in various supervisory capacities for General Electric Co. He is a graduate of the Polytechnical Institute of Brooklyn and a member of Tau Beta Pi, honorary engineering society. His wife and two sons will join him in Middletown as soon as he can locate housing.

Columbian's Key to Bristol, Va.-Tenn.

BRISTOL, Va.-Tenn.—J. Frank Key, president and general manager of the Columbian Paper Co. in Buena Vista, Va., has arrived here to serve the company in the same capacity. He was accompanied by Miss Marianne McFarlane, his private secretary, who succeeds Mrs. Helen Nicely Spencer.

THEODORE J. GROSS

—has been retained by the Union Bag & Paper Corp., as technical advisor to the corrugated box and board sales division in its sales promotion and product development program. He will make his headquarters at the principal offices of the company in the Woolworth building, New York City. . . . A graduate of the University of Virginia, Mr. Gross was for 12 years associated with the Container Laboratories, Inc. He resigned as president of that organization in 1946 to become managing director of the Shipping Container Institute and head its three-year study of the causes of rail freight loss and damage to merchandise shipped in fibre boxes. Upon completion of that study the Institute was dissolved last Summer.

Brazil Honors Percival Farquhar

RIO DE JANEIRO—Percival Farquhar, who left York, Pa., as a boy to start a career as an international capitalist and promoter, has been awarded the Order of the Cruziero do Sul by President Dutra of Brazil for half-a-century of enterprise in that country.

Mr. Farquhar's projects in Brazil have included paper mills, hydro-electric plants, and publishing businesses as well as harbor developments, railroads and mines.

Mr. Farquhar, now 85, and still active, was termed by President Dutra as "the American who has most contributed to Brazilian progress."

Four Masonite Personnel Changes

CHICAGO—Masonite Corp. reports four changes in organization. Edward H. Karer became manager of production planning in the wood fiber hardboard plant at Laurel, Miss., on October 15; F. O. Marion, assistant manager of industrial sales the last two years, has been advanced to assistant general sales manager in the company's general office at Chicago; J. R. Nunn, formerly assistant manager of the central industrial sales division, has succeeded Mr. Marion; and J. J. Allegretti, formerly an industrial salesman, has succeeded Mr. Nunn. Before joining Masonite, Mr. Karer was with the Balmar Corp., Baltimore.

Diver to Salvage Idaho Logs

COEUR D'ALENE, Idaho—Salvaging of millions of sunken logs from seven lakes and rivers in Northern Idaho will be started on December 1 by Lee E. Waggoner, San Francisco diver. He said the state has given him permission to salvage logs in lakes Pend Orielle, Coeur d'Alene, Priest, Spirit and Cocolalla, and the Priest and St. Joe rivers.

Mr. Waggoner will put a salvage crew to work at each place, and expects each to retrieve logs amounting to 40,000 board feet of lumber a day. Plywood, paper pulp and sawmill operators have offered to take every log salvaged, he declared.

Westvaco's McLaughlin Aids Survey

NEW YORK — Thirty-three ways in which manufacturers and other business corporations are reducing costs and increasing sales are presented in a survey on "Meeting the Challenge of the Buyer's Market," issued November 15 by the Controllership Foundation, New York, which is the research arm of the Controllers Institute of America.

The survey was made under the

WHY POSTPONE UBTANTIAL DAILY $AVING$?

That's exactly what you're doing when you defer expenditure for needed stock recovery equipment until "business conditions improve."

The Bird Save-All is one item of equipment that should never be put in the "deferred" class — not so long as valuable fibres are being permitted to get away anywhere along the line. From the very instant it goes on the job, the Bird Save-All starts earning visible, tangible returns in the form of good fibres to be made into "pay" paper.

May we submit recommendations and estimates?

BIRD MACHINE CO.
SOUTH WALPOLE, MASS.

EVIDENCE

A board mill reports that the two Bird Save-Alls put in last year have already paid for themselves and every pound of stock they now save represents clear profit.

One papermaker writes, "The Bird Save-All in our mill represents a saving of $5000.00 annually." Another reports a return of 5500 pounds of fibre per month.

A mill that installed a Save-All with their pulp drying cylinder machine recovers a ton of stock per day, saves 600 gallons of fresh water a minute.

A specialty mill figures the net return from their first Bird Save-All at $168.00 per day and orders several more.

GLATFELTER CELEBRATES PENNSYLVANIA WEEK

Pennsylvania Week at the P. H. Glatfelter Co., Spring Grove, Pa. . . was celebrated by inviting all of the teachers in the local consolidated school district, the school committee of the joint school board, the county school superintendent and the local ministers for a plant visitation and for dinner at the Lake Club. . . Object of this meeting was to more fully acquaint the teachers with the manufacturing facilities, the products made, and to get better acquainted. . . P. H. Glatfelter, (at left in picture) president, spoke to the group relative to a greater need for working together between schools and industry to better prepare students to enter the industrial field. He also discounted and showed the fallacy of deficit spending, and emphasized the fact that industry cannot operate under those conditions. . . W. S. McClellan, vice-president, discussed the Glatfelter movie, "A Short Course in Paper Making", which was shown to the group. . . Others in the picture from left to right are: H. E. Riegle, superintendent of schools; D. A. Sprenkle, school director; Rev. Franklin Glassmoyer, and John Miller, high school principal.

direction of Walter Mitchell, Jr., research director of the Foundation and managing director of the CIA, assisted by an advisory committee of Institute members, including S. W. McLaughlin, comptroller, West Virginia Pulp & Paper Co., and four others.

Dexter Wage Puzzle

DEXTER, N. Y.—Decision to reject an offer of 75 cents on the dollar reportedly made by the Frontenac Paper Corp., was disclosed by members of Local Union No. 64, IBPM, following a meeting on November 3.

The payroll claims, for two weeks' work in the paper machine department and three weeks' work in the finishing department, had been entered by 68 employes at the mill. Fifty-eight attended the meeting. The vote to reject the company proposal was unanimous. Burrell Rowe, local president, submitted the proposal to his fellow members.

It was stated that employes of the mill had been waiting four months for a settlement of the wage claims. Settlement of the wage issue has been in the hands of the New York State Labor Relations Board since July, when the mill closed.

The offer by the company had been made during a meeting between an attorney representing the former owners of the Frontenac, Attorney Muckmeyer; United States Labor Commissioner Arken; A. Raymond Cornwall, attorney for the Dexter Sulphite Pulp & Paper Co.; and Mr. Rowe.

Supreme Court Justice Clifford H. Searl, of Syracuse, issued a warrant of attachment on sufficient of the Frontenac Paper Corp. property in July, to satisfy claims totaling $7,882.99. This followed a proceeding brought by the state industrial commissioner through State Attorney General Nathaniel Goldstein.

Hayward B. Arthur, of Watertown, is receiver of rents and profits of the Frontenac Corp. He purchased the mill at a village tax sale.

Purchase of the local mill was made by the Frontenac Corp., which had had headquarters in New York City, from the Dexter Sulphite Pulp & Paper Co., in January, 1948. The mill closed down for two weeks in February for orders and necessary repairs.

A mortgage action was instituted by the former owners against the Frontenac Corp., headed by I. Lawrence LeSavoy, of New York City, in July.

Mills Humming, SAPI's Told

NEW YORK—It was indicated at a closed meeting of the Salesmen's Ass'n., of the Paper Industry at Midston House, November 7, that most mills had a back-log of orders, that some mills were running Sundays and that the future outlook is encouraging.

St. Regis Ups Barber, Vybiral

NEW YORK—Robert W. Barber has been named manager of the advanced engineering department of the Panelyte Division of the St. Regis Paper Co. George E. Vybiral succeeds Mr. Barber as chief engineer.

Ranney Well for Nanaimo Mill

NANAIMO, B. C.—What is said to be the only well of its type west of Wisconsin and the first of its type in Canada, is being installed here to supply naturally filtered water to Nanaimo Sulphate Pulp, Ltd., for its new plant under construction at Duncan Bay near Nanaimo.

The well, developed by California inventor Leo Ranney, takes water from the lowest level, where it has been filtered naturally through soil and sands. All color is removed by this process, and it is pure enough to use directly in the plant's bleaching operations.

The well is a concrete caisson 16 feet in diameter and 82 feet deep. A series of perforated, lateral seamless steel pipes finger out into the gravel for as far as 150 feet. About a dozen lateral pipes will be installed in the Nanaimo well, the first two of which will supply water to the plant.

An electric pumping station with deep-well turbines will be located on top of the well. This will pump water directly from the caisson to the mill through a five and one-half-mile, 40-inch wood pipeline.

C.I.F. Ltd., Portfolio Changes

OTTAWA—Portfolio changes of Canadian Investment Fund, Ltd., from June 30 to Sept. 30, 1949, included the following shares held at September 30 this year: Asbestos Corp., 7,950 shares, increase of 1,950; Consolidated Paper Co., 17,000 shares, increase 4,000; Howard Smith Paper Mills Co., 5,000 shares, increase 5,000; International Paper Co., 8,000 shares, gain of 800 shares; Powell River Co., 7,600 shares, increase 2,600 shares. All are common stock.

C-Z Ups Ream, Coney

WEST LINN, Ore.—John A. Ream, for many years personnel supervisor of the West Linn (Oregon) Division of the Crown Zellerbach Corp., has been named field representative for the retirement plan committee, in cooperation with the industrial relations department, operating out of the Portland office, and D. S. Coney has been promoted to personnel supervisor of the West Linn mill. George LaHusen is assistant personnel supervisor at the West Linn operation.

Gary De-Inked Paper Now in Use

HAMMOND, Ind.—The November 1 issue of the *Hammond Times* contained a four-page section printed on "the first newsprint ever made in Lake County." "These pages were from paper rolls turned out by the Gary Paper Mills, Inc., Gary, Ind., which employs a de-inking process in reclaiming old newspapers," the *Hammond Times* stated.

National Calls in Preferred Issue

NEW YORK—National Container Corp. will redeem, of the balance outstanding of its 4¾ percent cumulative convertible preferred stock. Notices of call were mailed November 10. Call

date is December 27. Following redemption capitalization, will consist entirely of 2,715,459 common shares. Long-term debt in the form of institutional notes, in the amount of $6,000,000.00 due in 1964, is outstanding. Net current assets on September 30, 1949 were estimated at approximately seven million dollars.

Oxford's 50th Anniversary

RUMFORD, Maine — The Oxford Paper Co. celebrated its 50th anniversary as a manufacturer of fine book papers with an open house October 4-5. During the two-day event, the mills were host to over 5,000 guests, including friends and relatives of employes and visitors from many parts of New England.

Groups touring the mill were met at each progressive operation by guides who explained in detail the machine and process being inspected. In addition, signs throughout the plant further described the various manufacturing functions.

Hosts for the occasion were company officials including Rex W. Hovey, executive vice-president; Donald Appleton, vice-president in charge of manufacturing; William H. Chisholm, assistant to the president, all representing the New York office of the company, and Theodore F. Spear, assistant vice-president, manufacturing and mill manager, Rumford.

In addition to the "see how it's done" tour of the mills, visitors had an opportunity to study a group of specially arranged exhibits which included large display panels featuring a simplified flow chart of the mill operations as well as a colorful display of the many end-products in which Oxford coated and uncoated papers are used.

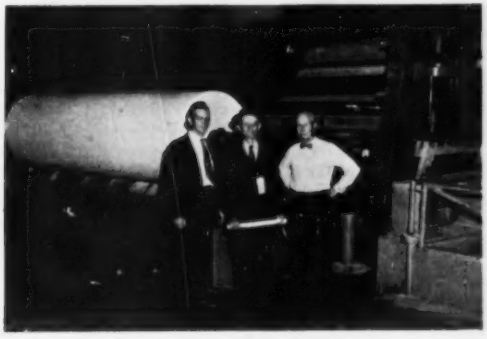
Of particular interest was the presentation by Lewis E. Small, 77, native of Rumford, of a sheet of the first paper manufactured by the Oxford Paper Co. when the mill originally started. Mr. Small was employed by the company which built the original machines and he came to work for Oxford when they were installed. He retired several years ago.

Guests' final view of the mill was an inspection of the quarter-mile long shipping platform, where more than 25 carloads of Oxford Paper rolls, skids and cases leave Rumford daily for destinations throughout the country.

BOXED WRITING PAPER WASHINGTON DISPLAY

One of two display cases filled with a striking collection of boxed writing paper, recently on exhibit in the main lobby of the Department of Commerce building, Washington, D. C. . . The exhibit was made possible by the cooperation of papeterie manufacturers and the Pulp and Paper Section of the U. S., Department of Commerce. . . Manufacturers whose products were displayed included: Eaton Paper Corp., Pittsfield, Mass.; Puritan Stationery Co., Inc., Philadelphia; Crane & Co., Inc., Dalton, Mass.; White & Wyckoff Mfg., Co., Holyoke; Kalamazoo Stationery Co., Kalamazoo; Powers Paper Co., Springfield, Mass.; A. E. Wilson & Co., Chicago; J. C. Blair Co., Huntingdon, Pa.; Hampshire Paper Co., Inc., Holyoke; Montag Brothers, Inc., Atlanta; Eastern Tablet Corp., Albany, N. Y.; Western Tablet & Stationery Co., St. Joseph, Mo.; Kellogg Division, U. S. Envelope Co., Springfield, Mass.

Rex. W. Hovey, executive vice-president, smiles a welcome as he cuts the paper "ribbon" opening the Oxford Paper Co. Mills at Rumford, Maine, to visitors during the company's 50th Anniversary Open House Program. Executives in the group to Mr. Hovey's left include from left to right, J. Everett Shea, manager purchasing department; Theodore F. Spear, assistant vice-president, manufacturing and mill manager, Rumford; Donald Appleton, vice-president in charge of manufacturing and William H. Chisholm, assistant to the president.



Lewis E. Small, center, retired Oxford employe for many years, holds in his hands a roll of the first Oxford paper made at Rumford. With him are William H. Chisholm, assistant to the president; and Theodore F. Spear, assistant vice-president, manufacturing and mill manager, Rumford. The group is standing beside a roll of paper at the end of Oxford's newest high-speed, machine-coating paper machine.

No Magic Anti-Pollution Formula

PORTLAND, Ore. — Frank McCollogh, an attorney for the Publishers' Pulp & Paper Co., at Oregon City flatly told the state sanitary authority on November 4 that the plant could not comply with the proposed order to stop polluting the river with industrial waste by December 31, 1951, because there is no known solution for the disposal of sulphide waste that is economically feasible.

However, sufficient members of the authority were not present to issue an order to five Willamette Valley pulp and paper mills to abate pollution by 1951 or close down. At the July session the authority warned that the order would be issued. A meeting has been scheduled for December 9 for further consideration of the order to the mills to either abate the pollution or close down by the 1951 date, which was set to coincide with the expected completion date of Portland's new $15,000,000 sewage disposal system.

"You might as well make the effective date day after tomorrow," Mr. McCollogh said to the authority in a discussion which pointed out there is no method which is economically possible to eliminate dumping of the sulphide waste into the stream.

"The industry and this company are making extra effort to solve this problem and it is unsolvable," McCollogh pointed out. He said the Weyerhaeuser Co., had spent $5,000,000 experimenting on a magnesium base process but that the company he represented did not have that kind of money to spend.

If the order is put in effect, Mr. McCollogh said, his company would have to go to court to protect its interests.

Harold Wendel, chairman of the authority, stated it might be a good thing to have it go to litigation. He said the law against pollution had been on the books ten years and the authority had been disregarding it for ten years because of the economic aspects.

Mr. McCollogh suggested the legislature be asked to work with the industry in research to try and find a solution to the problem.

Gair's Whitaker Convalescing

BOSTON—Charles W. Whitaker, resident manager of the Natick Box & Board Division of the Robert Gair Co., Natick, is at his home convalescing after an illness at Leonard Morse Hospital, Natick.

Chas. T. Young 3d, Merriman V.P.

NEW YORK—The Merriman Paper Co. has elected Charles T. Young III a vice-president. He was formerly manager of the electrical appliance division of the Associated Merchandising Corp.

Coosa River Mill Nearing Completion

CHILDERSBURG, Ala.—The 30-million-dollar Coosa River Newsprint Co., mill, nearing completion here, is expected to begin operation in January. It has a capacity of 100,000 tons, annually.

Sandroff Denies Evading Taxes

CHICAGO—Alvin E. Sandroff pleaded guilty on November 7 to two of three government indictments which charged him and two paper stock companies which he headed with owing the government $3,113,609.35 in taxes and penalties over the years 1942-45 inclusive. He was sentenced on November 8 to two years' imprisonment.

Mr. Sandroff pled innocent to the third indictment, which charged him with income tax evasion on his personal income for the years 1942-45. Assistant U. S. District Attorney Edward J. Ryan said he would seek dismissal of that indictment.

The indictments to which Mr. Sandroff pled guilty charged him and the Thomas Paper Stock Co., of this city, with avoiding payment of $824,305.21 taxes for the years 1942-44 inclusive. They also charged him and a Rockton, Ill., subsidiary of the local company, with evading $443,207.61 taxes for 1944-45.

Newsprint for Office Use

NEW YORK — Newsprint for office use is now being offered for sale in Canada only by the Powell River Co., Ltd. Called "Economy Typewriter Paper," the newsprint is cut to size 8½" x 11" and comes in parcels of 1,000 sheets, either white or colored. The paper is suggested for use as file copies, memo copies and inter-office notes, the American Newspaper Publishers Ass'n., reports. ANPA adds that it has been advised that, because of U.S. tariff duty, sale of this packaged newsprint for office use has been limited to Canada.

Sutherland to Study Housing

KALAMAZOO—Louis W. Sutherland, chairman of the Sutherland Paper Co., and former mayor of Kalamazoo, is back in municipal service as a member of a redevelopment agency study committee created to determine whether such an agency need be set up in Kalamazoo to clear slum areas to make industrial sites available. Mr. Sutherland was chosen by the city commission at its October 31 meeting.

70th Anniversary of Quality Pay-Off

MARINETTE, Wis.—Payments of 70th Anniversary Quality dividends were completed November 3 to employes of the Marinette Paper Co. The dividends, an extra week's pay for each employe, amounted to $63.80 gross average which was reduced to $53.90 after tax deductions. All employes as of October 16 received bonuses. Total amount paid was $39,308.92.

On Five-Day Week Basis

OTTAWA—Anglo-Newfoundland Development Co., went to a five-day week basis of operation in Newfoundland on November 1, because of present market position caused by devaluation of sterling and world-wide shortage of dollars. The five-day week will remain in effect until the market position is clarified.

Garnett Awarded Silver Acorn Medal

VANCOUVER, B. C.—Gilbert Garnett, president of the Coast Paper Co., recently received the Silver Acorn Medal from Governor General Viscount Alexander in Ottawa in recognition of his services to the Boy Scout movement. Mr. Garnett until recently was president of the Vancouver District Council of Boy Scout Ass'n.

Paper Exec. Kzoo Vice-Mayor

KALAMAZOO — The new vice-mayor of Kalamazoo is Allan B. Milham, 56, who was with the old Bryant Paper Co., now a unit of the St. Regis Paper Co. After working through the various departments for 30 years, Milham became president of Bryant in 1942. He continued in that position until his retirement in 1946.

Macon Kraft Aids Community Chest

MACON, Ga.—The Macon Kraft Co. has given the Community Chest the largest gift in the current campaign for $175,000. The amount, turned over by Herbert A. Kidd, vice-president and general manager of Macon Kraft, was 53 percent higher than the company total last year, it was stated.

Noble Addresses ASQC Meeting

MINNEAPOLIS — Dr. Carl E. Noble, director of quality control for the Kimberly-Clark Paper Corp., Neenah, Wis., spoke on November 4 at a meeting of the Minnesota section of the American Society for Quality Control held at Coffman Memorial Union.

Rushmore Names St. Louis Broker

GOUVERNEUR, N. Y.—Rushmore Paper Mills, Inc., has named J. W. Sonnenday of the Food Brokers Co., St. Louis, Mo., as its brokerage representative there for Blue Ribbon, Protex and Vanity Fair paper items.

Eddy's Warner, Three Rivers Mayor

THREE RIVERS, Mich. — Frank Warner, office manager for the Eddy Paper Corp., plant, was elected mayor of this city on November 10.

Allen C. B. Sales-Adv. Mgr.

FITCHBURG, Mass.—Walter Allen has been named sales and advertising manager of the Crocker Burbank Co. Ass'n.

ASSOCIATIONS . . .

Kzoo Valley TAPPI Meeting

KALAMAZOO—Automatic control for Jordans was discussed and demonstrated for the Kalamazoo Valley section, TAPPI, on November 3, by Bruno E. Prevost, Lawrence, Mass., of the Emerson Mfg. Co. Mr. Prevost used a small working model of the control to supplement his description.

Claimed to be the first to supplant the manual control of Jordans, the Emerson is a combination of electric and air operation. The manual can be cut in should there occur any disruption of the automatic.

When you wonder if you can really afford Stainless Steel

—ask yourself these questions

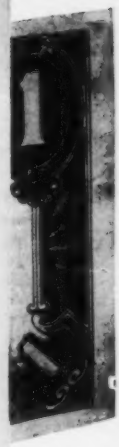
Can you afford to put up with corrosion and erosion of digester strainers, when Stainless Steel construction will so decrease these troubles that strainers will last up to 10 times as long?

Can you afford to use carbon steel tubes in the first effect of your evaporators when Stainless Steel tubes will extend their life from months to years?

Can you afford the cost of off-quality breaks or stock losses caused by metallic contamination, rust and discoloration which quickly vanish when Stainless is used?

Can you afford the cost of slow, laborious cleaning that easy-to-clean Stainless makes unnecessary?

Can you afford equipment repairs and breakdowns that retard operations and increase your costs, when tough, strong heat-resisting and corrosion-resisting Stainless Steel will reduce them to a minimum?



In other words, can you afford to run your mill without taking advantage of the proven benefits that Stainless Steel assures? To be frank, we don't think so. Not if you want to produce good paper, fast and economically.

That's why so much of today's high-speed paper mill equipment is using Stainless Steel in greater quantities and in more places than ever before. And much of it is *U·S·S* Stainless Steel because there's no finer Stainless produced for pulp and paper mill service. We'll be glad to show you how this service-tested, *perfected* Stainless Steel can be applied to your equipment—to increase its life, improve its performance and to reduce your operating and maintenance costs. Just drop us a line.

AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES: CLEVELAND, OHIO · CARNEGIE-ILLINOIS STEEL CORPORATION, PITTSBURGH & CHICAGO
COLUMBIA STEEL COMPANY, SAN FRANCISCO · NATIONAL TUBE COMPANY, PITTSBURGH · TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM
UNITED STATES STEEL SUPPLY COMPANY, WAREHOUSE DISTRIBUTORS, COAST-TO-COAST · UNITED STATES STEEL EXPORT COMPANY, NEW YORK

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U·S·S STAINLESS STEEL

SHEETS · STRIP · PLATES · BARS · BILLETS · PIPE · TUBES · WIRE · SPECIAL SECTIONS

9-527

UNITED STATES STEEL

WALPOLE SEGMENT OF THE PLANT VISIT PROGRAM

Plant visit program of the Fourth Engineering Conference of TAPPI onThursday, November 3, was composed of the Walpole trip to Bird Machine Co., Bird & Sons, Inc., the Foxboro Co., and Draper Bros., Co., the Worcester trip and the Lynn trip. Photographed above are the 86 members of the Walpole group at the luncheon stop at Lafayette House on the Foxboro-Walpole road.

4th TAPPI Engr. Meet

Boston, Oct. 31-Nov. 3

BOSTON—The Fourth Engineering Conference of TAPPI at the Statler hotel, October 30-November 3 registered a record attendance of 452 members and guests.

The opening day's business included a general session with George H. Pringle as general chairman and opening remarks by A. E. Bachmann of the Missisquoi Corp., TAPPI president. Meetings were devoted to Mill Design and Economic Aspects, Engineering Data Sheets, Engineering Research and Machine Design, and Materials Handling.

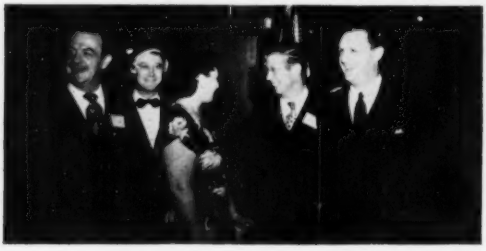
Tuesday's business included sessions on Steam and Power and on Mill Maintenance and Materials. The latter was subdivided into: (a) Steam and Power, (b) Mill Design and Engineering Aspects, (c) Engineering Research and Machine Design, (d) Materials Handling, and (e) Paper Manufacture —Fourdrinier.

At six p.m. there was a get-together party and at 7 p.m., a dinner, both sponsored by New England Manufacturers to the Paper Industry. The dinner was called a Boston APTPI Party. Photos of it are shown herewith. Sponsors included: Bird Machine Co., John W. Bolton & Sons, Inc., Cheney Bigelow Wire Works, Clark-Aiken Co., Draper Brothers Co., Foxboro Co., General Electric Co., Holyoke Machine Co., Improved Paper Machinery Corp., E. D. Jones & Sons Co., Lawrence Pump & Engine Co., Lodding Engineering Corp., and Lumsden & Van Stone Division, Midwest Piping & Supply Co.

Also: Chas. T. Main, Inc., Magnus Metals Division of the National Lead Co., Mason-Neilan Regulator Co., Mt. Hope Machine Co., Norton Co., Poirier Control Co., Portland Copper & Tank Works, Record Foundry & Machine Co., Rice Barton Corp., Riley Stoker Corp., Simonds Saw & Steel Co., Stone & Webster Engineering Corp., Stowe & Woodward, Inc., Sinclair Co., Torrington Co., Morton C. Tuttle Co., Tyer Rubber Co., Union Machine Co., Warren Steam Pump Co., Inc., and Westinghouse Electric Corp.

Wednesday saw the following sessions: Drying and Ventilating, Electrical Engineering, and round tables on Mill Maintenance and Materials, Electrical Engineering, Drying and Ventilating, Paper Manufacture—cylinder, and data Sheets.

Thursday was plant visit day, which offered a choice of three industrial plant tours.



Left to right: R. T. Barnes, Jr., Int. Nickel Co., Inc.; Douglas Jones, Technical Section Canadian Pulp & Paper Assn.; Mrs. Jones; Richard Bingham, TAPPI.

P. B. Sadtler, Gen. Amer. Transportation Co.; Mrs. Sadtler; S. L. Foster, Kalamazoo Vegetable Parchment Co.; Mrs. Wynne Roberts; Wynne Roberts, Finch Pruyn & Co., Inc.

Left to right: L. Owen, Champion International Co.; Mrs. Owen; John Calnan; Norman Bearse, Champion International Corp.; Mrs. Calnan and Mrs. Bearse.

This happy group at the Sponsors Dinner at Hotel Statler, Tuesday evening, November 1, is typical of those who filled the spacious dining room.

A group of 80 members of TAPPI made the trip to Worcester, visiting the following plants: Riley Stoker Co., Norton Co., Rice-Barton Co., Lodding Engineering Co. An interesting movie which explained the theory and operation of boilers and boiler construction was shown to the group. . . Upon arrival at the Norton plant lunch was served in the company dining room. The group then made a short tour of the plant, followed by a visit to the Rice-Barton Co., where they saw, among other things, the spectacular pouring of a drier roll. At Lodding Engineering the group watched the manufacturing process for several precision doctor blades and observed the operation of models of an oscillating doctor and a brake conveyor. At the end of the plant visits the group was served refreshments at the Worcester Club before returning by bus to the Statler in Boston.

One group visited the General Electric plant at Lynn, Mass., while others inspected the plants of the Rice-Barton Corp., Norton Co., and Lodding Engineering Corp., all in the Worcester area. The third group, chose the "Walpole-Foxboro Trip."

Special buses conveyed the visitors from the hotel to Bird Machine Co. plant, where they spent an interesting morning. The party then moved to Lafayette House, where luncheon was served for 100 guests, including the visitors and officials of the Foxboro Co. and Bird Machine Co., the joint hosts for the occasion. After a group picture had been taken the delegates boarded the buses to visit the nearby Foxboro plant. Upon leaving Foxboro the party divided, some going to the Draper Bros. Co. plant, in Canton, while others visited Bird & Son, Inc., in East Walpole.

Abstracts of papers delivered at the Conference appear in the Industrial Development Section of this issue of *Paper Trade Journal.*

Henry Perry, Consultant; Dick Bingham, TAPPI.

A. M. Robinson, Esselen Research Corp.; Norman F. Hoch, Alliance Paper Mills, Ltd.; W. A. Messervey, Canadian General Electric; J. T. MacDonald, Provincial Paper, Ltd.; Mrs. MacDonald; C. P. Robinson, Heppenstall Co.

Left to right: E. H. Neese, Jr., Beloit Iron Works; C. W. Walters, Stowe-Woodward, Inc.; Mrs. C. Morganstern; R. M. Leighton, Stowe-Woodward, Inc.

Left to right: L. A. Blaisdell, Kelco Co.; C. P. Robinson, Heppenstall Co.; G. E. Lockwood, Paper Trade Journal.

Left to right: Mrs. Alvin H. Johnson; Alvin H. Johnson, Consulting Engineer, New York City.

"Deep South" Supt's. Meet

MONROE, La. — The Southern Division of the American Pulp & Paper Mill Superintendents Ass'n., Inc., held a highly successful fall meeting here on October 24-26. Headquarters were at Hotel Frances but some of the meetings were at the Virginia hotel. Registration approximated 200 persons.

The meeting was called to order on the morning of October 24 by P. J. Hannan, Southern Advance Bag & Paper Co., Hodge, La., chairman of the division. He introduced Herbert Bailey, Jr., manager, Chamber of Commerce, Monroe, La., who welcomed all members and guests to the city. The rest of the morning was given over to the presentation of two papers, with lengthy discussion following each one.

Dallas E. Henry, Southern Advance Bag & Paper Co., Hodge, La., gave the first of these two papers. His subject was, "Industrial Injury Control As It Applies to the Superintendent."

In his presentation, Mr. Henry related that the injury rate of the pulp and paper industry is 26th out of 40 major industries and that this rate is 31 percent above the average of the 40.

Mr. Henry continued: "Industrial accidents are not 'accidents.' They are the result of mistakes. . . . If our injuries were the result of faulty design and equipment, the plant 20 years old would have a much poorer record than the modern plant. This is not the case, because some of the older plants have much better records than the newest and most modern ones."

In the opinion of Mr. Henry, whatever plan is worked out for controlling injuries, reports should be made to the superintendent. The plan, he said, that works best is one that lets every worker know that the *superintendent* wants injuries eliminated, because he desires it, and not someone outside the department.

The safety man, commented Mr. Henry, should be used by the superintendent the same way that he uses the services of the engineering, laboratory, maintenance, or any other service department.

Mr. Henry called attention to a study made by Heinrich, a foremost authority on safety, that revealed that a worker will do the same unsafe act an average of 330 times before he is injured severely enough to lose time from work—also that the worker will be injured 29 times out of 330 enough to be given first aid. These statistics, Mr. Henry declared emphatically, show that the superintendent requiring a report on each first-aid injury has a chance to correct unsafe practices before they produce injuries.

"Refractory Practices in Kraft Mills" was the subject of the second paper on the morning of the first day of the meeting. This paper was presented by M. C. Brashares of the Harbison-Walker Refractories Co., Pittsburgh.

The afternoon of October 24 was given to presentation of four papers: "Lime Processing Equipment," by W. H. Tock, Allis-Chalmers Mfg., Co., Milwaukee; "Some Remarks on Stock Preparation," by P. B. Fowler of E. D. Jones & Sons Co., Pittsfield, Mass.; "Chipper Drives," by H. B. Barrow of the Atlanta office of the General Electric Co.; and "Chipper Design and Operation," by N. P. Wardwell, Carthage Machine Co., Carthage, N. Y.

Mr. Tock, in his paper on lime processing equipment, touched upon the care necessary in the selection of a kiln; covered in some detail the development of the kiln application; gave consideration to the mechanical components of kilns — kiln shell, riding rings, carrying mechanisms, kiln thrust mechanism, and kiln drive.

Operating procedure, ring formation, and kiln controls were other items that came up for consideration by Mr. Tock.

Mr. Fowler, in treating of stock preparation, aggressively took the offensive in an attempt to bring about a better terminology of stock preparation. The first (and worst) of the abused terms, he said, is the word "hydration." This word, he continued, suffers miserably from lack of definition and exact knowledge, and it suffers even more so when combined in its usage with the words "freeness" and "slowness."

He asked, "What do we actually know about hydration?"; and suggested that freeness tester readings must be combined with other measurements (such as microscopic and fiber length determinations) to fully evaluate a result.

The second, and next objectionable of misused terms, in the opinion of Mr. Fowler, is the word, "refiner." Referring to Webster's definition of the word "refine"—"to separate from impurities, to improve," he stressed that the whole object of the equipment from barking drum to machine headbox is to produce that effect.

Mr. Fowler further related that, in general, the beater is the most flexible of all the stock preparation machines; that the two major disadvantages of the jordan, in common with its variant machines, is its taper and its filling unbalance; and that, in any refining problems, the two questions to be answered are: (1) "What do I really want to do to my stock to get the desired sheet?"; and (2) "How can I best get these results?"

A modern beater-jordan combination, in the opinion of Mr. Fowler, is the ultimate solution to the refining problem.

Mr. Barrow, in his paper on chipper drives, credited H. W. Rogers, consulting engineer for the industrial engineering division of the General Electric Co., and formerly manager of its paper and textile application engineering division, for much of his information.

Mr. Barrow gave the following figures as examples of the maximum horsepower requirement per cubic foot of chips per second: Douglas fir, 296; black gum, 362; yellow pine, 344; and red oak, 486. If a motor is to operate at the maximum requirement continuously, said Mr. Barrow, the horsepower rating must be equal to the **maximum requirement.**

Among other comments made by Mr. Barrow were the following:

"The selected type driving motor may be a synchronous, squirrel-cage, or wound rotor induction motor.

"The synchronous motor gives constant speed chipping. It is the least expensive per horsepower at the lower speeds; and, for that reason, is usually direct-connected. It has the best power factor.

"The squirrel-cage motor and control for full voltage starting is most simple. The motor is least expensive in the higher speeds, consequently it is usually belted.

"The wound rotor motor can be used direct-connected or belted. It, and its primary and secondary control, are more expensive per horsepower than either the synchronous or the squirrel-cage motor and control."

Mr. Barrow further said that if it is chips you want and you prefer not to throttle or regulate the wood for size or quantity going into the spout, give the drive plenty of horsepower capacity, providing your power supply can handle the load swings.

The paper on chipper design and operation by N. P. Wardwell was largely a repeat on the paper, "Basic Issues in Chipper Design," presented by Charles R. Wardwell, an associate of N. P. Wardwell, at the annual meeting of the Superintendents Ass'n., in Atlantic City last June. In addition, Mr. Wardwell presented some movie film which portrayed the capacity, speed, and efficiency of the multi-knife chipper.

The program of Tuesday morning, October 25, was given over to a short business session, to the presentation of two papers, and to a panel discussion.

The business session dealt with the election of officers for the Division for 1949-50. Fred Augustine, Gaylord Container Corp., Bogalusa, La., as chairman of the nominating committee presented a slate that was voted in unanimously. It comprised: Andrew F. Downey, St. Regis Paper Co., Pensacola, Fla., chairman; Otha Winningham, National Container Corp., Jacksonville, Fla., first vice-chairman; John J. Thompson, Southland Paper Mills, Inc., Lufkin, Texas, second vice-chairman; and Augusta D. Lavert, Gaylord Container Corp., Bogalusa, third vice-chairman.

The two papers presented before the meeting covered subjects that had been treated by their respective authors at one or more previous meetings of the Association. One of these papers, given by Bruno E. Prevost, Emerson

VIRTUALLY UNBREAKABLE!
So strong that the pH-sensitive bulb can withstand as much pressure as the thick stem itself!
Abrasion resistant—unusually rugged for long life and reliable measurement even in highly abrasive slurries!
Chemical durability—excellent in the strongest acids and alkalis . . . even at elevated temperatures!
COVER EXTREME TEMPERATURES!
30° to 130° C at high pH—with the new high temperature—high pH glass.
—20° to 100° C—with the new general-purpose glass. Will withstand even repeated freezing.
Now- NEW
BECKMAN
pH Electrodes
UNPRECEDENTED pH RANGE!
0 to 14 pH—with the high-temperature high-pH glass . . . only small reproducible deviation near extreme limits, even at high temperatures.
0 to 11 pH—at room temperature and 0 to 10 pH at boiling for the general-purpose glass . . . without correction for sodium ions!
IMPROVED CONSTRUCTION!
Simplified, heat-resistant construction eliminates wax filling . . . retains patented Beckman internal shielding . . . increases measurement precision.

Only *Beckman Glass Electrodes* offer all of these features:

- **RAPID RESPONSE** . . . accuracy with speed and convenience.
- **STABILITY** . . . to match the high precision of BECKMAN pH METERS.
- **INTERNAL SHIELDING** . . . gives complete freedom from outside electrostatic interference.
- **INTEGRAL LEADS** . . . Continuous insulation into the electrode . . . connections located on protected panel board.
- **EXTREME TEMPERATURE RANGE** . . . Several types permit use from below freezing to boiling *and above!*
- **ENTIRE pH SCALE** . . . *Very small* sodium ion errors . . . e.g., with high-temperature high-pH glass, only 0.2 pH deviation at 13.7 pH in 1 N sodium hydroxide.
- **FACTORY SEALED** . . . rigidly tested . . . no maintenance.
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And . . . *REALLY TOUGH* . . . can even be used as a stirring rod!

These new electrode glasses are now being used in several Beckman electrode styles. As rapidly as possible, they will be available in the full line of Beckman Glass Electrodes.

Constant Research over the years has maintained Beckman Leadership in the instrumentation field . . .
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—Beckman *Radioactivity Meters and Special Instruments* . . . *Unsurpassed for Reliability!*

BECKMAN INSTRUMENTS
control modern industries

Manufacturing Co., Lawrence, Mass., was entitled "Jordan Plug Pressure Control System." Mr. Prevost first presented this paper at the 1949 annual meeting of the Association at Atlantic City; again at the 1949 fall meeting of the Northeastern Division at Poland Spring, Maine; and more recently at the 1949 fall meeting of the Southeastern Division at Roanoke, Va.

Jacob Edge, Downingtown Mfg. Co., Downingtown, Pa., gave the second paper. His subject was "The Plain Press of Tomorrow." This paper, like that of Mr. Prevost's, also was presented at the 1949 fall meeting of the Southeastern Division.

Probably, the highspot in the convention proceedings, was the panel session which was devoted to a discussion of "Slime Control In Kraft Mills." Approached fundamentally, the panel members answered numerous questions put to them by their listeners and, in a few instances by individual members of the panel itself.

Membership of the panel included Vernon Woodside, Mathieson Chemical Corp., New Orleans, chairman; Harvey E. Berg, National Aluminate Corp., Chicago; Fred Soderberg, General Dyestuff Corp., New York; Charles P. Kirchen, Buckman Laboratories, Inc., Memphis; Carl Friedrichs, Wallace & Tiernan Co., Houston; and William N. McKee, W. A. Cleary Corp., New York.

The afternoon of October 25 was given over to golf, the evening to a banquet and dance at Hotel Frances. On the day previous there had been a luncheon for the men at the Virginia hotel; a luncheon for the ladies at the Bayou De Siard Country club. The ladies also enjoyed a boatride on the afternoon of October 25.

At the men's luncheon on Monday, Harry E. Weston, associate secretary-treasurer of the national Association, presented a sketch on "Names to Remember." Using lantern slides of five different men of importance to the development of the pulp and paper industry, three members of the luncheon group as contestants, and a biographical sketch of each of the men covered by the lantern slides shaped up in a quiz fashion he queried the contestants as to the identity of the portraits. Four of the portraits were identified by the contestants, the winner being Anatole Navarre, Orange Pulp & Paper Mills, Inc., Orange, Texas. The runner-up was D. C. Metcalf, Brown Paper Mill Co., Inc., West Monroe, La.; the third contestant, Dallas Henry, Southern Advance Bag & Paper Co., Hodge, La.

The portrait unidentified by the contestants was identified by a member of the luncheon group.

Another feature was the showing of several films by Walter Glass of F. C. Huyck & Sons Co., Albany, N. Y. These films, with the photography by Mr. Glass, covered a fishing trip and winter vacation in the wilds of northwestern Ontario, and wood handling practices at the International Paper Co., Southern Kraft Division mill, Georgetown, S. C.

Charles H. Reese, Nekoosa-Edwards Paper Co., Port Edwards, Wis., as president of the Association, was introduced at the banquet by P. J. Hannan.

The meeting closed with a trip through the mill of the Brown Paper Mill Co., Inc., on the morning of October 26.

Officers of the Southern Division to be commended for the high caliber of the meeting include: Mr. Hannan, chairman; Andrew Downey, St. Regis Paper Co., Pensacola, Fla., first vice-chairman; and W. P. Newman, Southern Advance Bag & Paper Co., Hodge, La., secretary-treasurer. Vernon Woodside, Mathieson Chemical Corp., New Orleans, Industrial Affiliates representative in the area served by the Southern Division, and numerous other suppliers also are to be congratulated for their efforts in making the meeting a success.

Gene Bechard, Atlanta, Ga., connected with the Eastwood Nealley Corp., and Kenneth Holt, Brown Paper Mill Co., Inc., West Monroe, were in charge of the golf tournament. Mrs. Evans Etheridge, Mrs. W. J. Riley, and Mrs. George Weaks, the ladies' entertainment.

NAWMD Div. Meeting

NEW YORK—Continuing its Divisional Area meeting program, the National Ass'n. of Waste Material Dealers, Inc., reports that the Organizational meeting of the newly-formed Atlantic Division will be held November 30, at the Hotel Astor.

The meeting, open to N.A.W.M.D. members as well as non-members, will start with a business session at 2:00 p.m., followed by a cocktail party and dinner.

The Atlantic Division includes New York, New Jersey, Maryland, District of Columbia, Delaware and Pennsylvania, Harrisburg and east thereof.

NAWMD Coast Conference

SAN FRANCISCO—A challenge to the waste material industry to discard its defensive attitude was issued by James T. Flannery of the James T. Flannery Co., Jersey City, N. J., president of the National Ass'n., of Waste Material Dealers, Inc., at the opening general meeting of the group's Joint Pacific Coast Conference with the Institute of Scrap Iron and Steel, Inc., at the Palace hotel on November 9.

President Flannery told the more than 50 members and guests in attendance from this area, Southern California and the Northwest, that the industry's position is looming larger daily in importance.

President Flannery shared speaking at the meeting with Clinton M. White, managing director of NAWMD, who highlighted some of the Association's current activities.

Following the talks by Messrs. Flannery and White an open forum was held on problems of interest to the entire industry. The meeting was opened by D. J. Chiappari, Charles Harley Co., Los Angeles, NAWMD Pacific Coast chairman, who turned over the procedings to Earle Glant, Pacific Iron & Metal Co., Seattle, director, who acted as meeting chairman. After the business meeting, the annual Pacific Coast dinner for officers and directors was held.

MISCELLANY . . . .

Czechoslovak Woodpulp

"The leading Czechoslovak woodpulp mills some years ago reached a mutual understanding regarding the export of their products, and ever since have been cooperating on that basis," the *Czechoslovak Exporter* reports. "The SPS, the World's Price Convention for Woodpulp, was supported by the woodpulp mills of Czechoslovakia, and fairly large quantities of pulp were placed abroad. The newly organized corporation, the Czechoslovak Wood Pulp Export Company, is thus only the outcome of former efforts to unite all mills in one export center.

"Czechoslovakia is an important producer of woodpulp which is turned out first and foremost for the paper and artificial fibres industry. In past years, with her output of 340,000 tons per annum, Czechoslovakia participating with 1½ percent in the total world production of 23,000,000 tons, ranked 11th among the countries concerned. Owing to the growing home consumption of paper and artificial silk Czechoslovakia cannot now export 50 percent of its woodpulp production as was the case before the war. In the matter of quality, however, many customers in Europe and overseas appreciate Czechoslovak deliveries of this commodity. The erection of new mills will shortly enable a rise in production to take place, and at the same time will allow of larger quantities being released for export.

"The manufacture of woodpulp in Czechoslovakia is concentrated mainly in the spruce and fir growing regions of the Beskids and Carpathians. The mills which can boast of a fine (and tradition) are being gradually modernized, turn out all brands of Sulphite Pulp, such as Bleached, Bleachable and Unbleached for export, for further processing into paper, as also Rayon Pulp of notable quality and suitable analytical properties for the manufacture of artificial fibres. Many years' experience with deciduous wood enable the Czechoslovak mills to produce fine qualities of pulp from beech, poplar, aspen and similar woods for the manufacture of paper and artificial fibres.

"The Czechoslovak Woodpulp Export Co., whose task it is to export

woodpulp from all Czechoslovak mills, has its old and well-proven connections with the main consumers in Europe, in U.S.A., and in the main states of South America. The quantities available for export hardly suffice to satisfy the demands of these extensive markets, but none the less interest is shown in taking up trade relations with new consumers in countries where the paper industry is in process of development, since our far-reaching experience of many years can but favorably influence deliveries.

"Our customers abroad who are direct consumers, whether they purchase direct themselves or through the intermediary of governmental buying centers will, we feel sure, welcome our newly-organized export company which is able to supply them with woodpulp from all the six most important Czechoslovak mills, those of Zilina, Supra, Solo, Martin, Vratimov and Gemerská Horka, as also from other woodpulp mills whose output is smaller but the quality good.

"The Czechoslovak Woodpulp Export Co., is prepared to meet the wishes of all consumers abroad with deliveries of first-class quality and is looking forward to long and friendly cooperation."

Czech Pulp on British Market

LONDON—Under the heading "Czechoslovak Wood Pulp on the British Market," the *Bulletin* of the British Czechoslovak Chamber of Commerce states that prior to the last war Great Britain was one of the main customers for Czechoslovak wood pulp. These prewar business contacts were renewed immediately after the liberation of Czechoslovakia, but Government restrictions and controls prevented full resumption of Czechoslovak wood pulp imports to this country.

British paper mills show increased interest in these Czechoslovak products the *Bulletin* adds, and it may be anticipated that with the lifting of some of the present restrictions, increased imports of Czechoslovak wood pulp will again be possible.

The Czechoslovak Woodpulp Export Co., Ltd., Bratislava, is the sole exporter of bleached and unbleached sulphite pulps of all kinds, sulphite lyes and brewer's pulp. Its sales representative for the U.K. is Lyddon & Co., Ltd., 145, Moorgate, London, E.C.2.

Weigh Maine Resources

ORONO—Maine's agricultural and industrial future was weighed at a conference on the Pine Tree State's resources and their development at the University of Maine on November 4.

Nearly every Maine industry—from wood product manufacturing to food processing—was represented.

In a panel discussion on industrial development, an S. D. Warren Co., official urged that research be utilized to provide Maine firms with lower manufacturing costs, improved quality and new products. Frederick H. Frost said it has become evident that concerns can hire men trained in the application of the scientific method and make a persistent and excellent profit from their employment.

Everett F. Greaton, executive director of the Maine Development Commission, was final speaker on the morning program, saying that despite reports to the contrary, industry is not moving from Maine.

"Maine has shown," he said, "and continues to show, a net increase in the number of industries each year."

Dr. Arthur A. Hauck, president of the university, introduced the speakers, and following the morning program, presided at a luncheon in Estabrooke hall.

Several editorial representatives of technical publications serving the pulp and paper industry, guests for the all-day session, were introduced by John B. Calkin, director of the university's department of Industrial Cooperation. They were: Richard T. Bingham, technical assistant to the secretary, TAPPI; Richard W. Porter, editorial director, *Paper Industry* and *Paper World;* and E. P. McGinn, industrial editor of *Paper Trade Journal.*

Five panel discussions were held during the afternoon with 25 guests, prominent in their fields, speaking on a variety of topics appropriate to the conference.

The importance of local stream pollution situations in many cases is greatly over emphasized, according to Russell L. Winget, executive secretary of the National Council for Stream Improvement, Inc., of New York.

Speaking as a member of the panel on Utilization of Wood, Mr. Winget said: "Whenever such a stream pollution situation develops, there is generally a hue and cry far out of proportion to the actual damage involved and in many cases the actual equities involved are not generally recognized."

He said he was not attempting "to whitewash gross and intentional pollution, but we must realize," he added, "that a large and established industry should be entitled to a reasonable use of water resources of the state for manufacturing processes and the transportation of wastes in recognition of the tremendous contribution which it makes to the economic life of the state.

"For instance," he said, "here in Maine, the pulp and paper industry is the largest manufacturing industry. The industry has invested almost $300,000,000 in plants, structures and other physical facilities. It employs 19,000 workers with a payroll of over $42,000,000. It contributes over $4,000,000 in state taxes and according to my information, some 30 cities and towns in the state are on the average 50 percent dependent on the pulp and paper industry."

Although there are about 8,500 miles of rivers and streams in the state, only approximately 200 miles of this total are affected even to a minor degree by wastes and from the 29 pulp and paper mills in Maine, Mr. Winget emphasized. This represents less than three percent of the total mileage of rivers and streams in the state and "it certainly appears that this is a very reasonable use of the water resources of the state in view of the significant contribution to the economic life of the state which is made by the industry," he said.

James Rettie, chief of the division of forest economics, Northeastern Forest Experiment Station, Upper Darby, Pa., spoke on "The Tough Knots in Maine's Timber Utilization Problem."

He said that the commercial forests of Maine contain about 200 million cords of timber. Of this total, about half is in the softwood species and half is in the hardwoods.

A large amount of the hardwood volume is in old decadent trees that are highly vulnerable to attack by insects and disease. He attributed the decadent condition of the hardwood timber in large part to the fact that it has not been used. Loggers have taken the softwoods and by-passed the hardwoods.

Mr. Rettie recommended better cutting practices, building up the industrial utilization of hardwood, a road system to get to hardwood stands, better marketing and more research.

Thomas L. McLintock, Northeastern Forest Experiment Station, Bangor, spoke on "Forest Management for the Improvement of Forest Production." He told of the various steps which can be taken to improve forest lands, recommending the expansion of research, an active program of forest management, and an intensified educational program.

Edward F. Thode, associate professor of chemical engineering at the University of Maine, had for his topic "Institutional Research on the Utilization of Wood."

He said the utilization of waste products and the improved utilization of raw materials constitute a field for research in which public and academic institutions should take the lead. He told of the four types of research which can be carried on at educational institutions, and listed some of the items now under investigation.

Denies Excessive ECA Aid

By RICHARD LACOSTE

WASHINGTON — A categorical denial that the Economic Cooperation Administration was aiding the European pulp and paper industries to the point where these industries in the U.S., would be affected adversely has been made by Joseph E. Atchison, ECA pulp and paper expert.

Mr. Atchison recently returned from a four-month European trip, where he advised Marshall Plan countries on machinery improvements and pulp and paper processes.

"Most European countries lag far behind the U.S., and Canada," Mr. Atchison said. "Industry leaders feel that their machinery is 30 years behind the times. In fact," he added, "most machines are small and slow-running—what we would consider the obsolete type here."

Mr. Atchison stated that ECA had aided financially in the modernization of Western European paper mills, estimating that some $6,000,000 of ECA funds have been expended for this purpose. He expressed the opinion that building up these industries in Europe would not work eventual hardship on their American and Canadian counterparts.

"What ECA is doing is attempting to build up productivity so these countries can supply their own demands," Mr. Atchison explained. "Consumption of paper is low in most countries. As standards of living increase, demands for paper will increase."

While in Europe, Mr. Atchison visited France, Italy, Germany, Holland, Belgium, Austria and England. He was particularly impressed by the progress made in the manufacture of pulp from straw. Both Italy and France have experimented considerably with pulp from straw and hardwood, and Britain is looking into the possibilities, Mr. Atchison said.

While in Paris, Mr. Atchison summed up his European findings for the press.

"Italy today leads the world in the manufacture of pulp from straw. About 35,000 tons of paper pulp is being manufactured there this year from straw. This is used in many grades of paper, including newsprint, book-paper, grease-proof paper and cigarette paper.

"At the same time, Italy is in the forefront of nations developing the use of straw, grasses and hardwoods for newsprint pulp. In previous years, mechanical difficulties in converting hardwoods into suitable pulp limited the newsprint industry largely to the use of softwoods.

"Italy's pulping of hardwoods is limited chiefly to poplar. Poplar trees there mature to usable size in eight years. The cost of pulpwood in Europe averages about twice the cost in the United States. So Italian farmers find it profitable to shift some of their crop land to the production of poplar trees."

Italy has been aided more than any other European nation by ECA in the modernization of its paper mills, according to Mr. Atchison. Already it has received $1,650,000 for a modern, high-speed newsprint machine which will increase the country's newsprint capacity by 30,000 tons a year. In addition, ECA has allocated the country nearly a million dollars for a government-owned straw-pulp mill.

N. C. August Employment

RALEIGH, N. C. — Employment dropped from 6,000 to 5,500 in the North Carolina pulp, paper and paper board mills for the month of August. However, earnings in these mills increased 2.1 per cent to an average of $70.99 weekly. The average hourly figure was $1.538. The average hours worked per week was 46.1.

Lima FAO Conference

WASHINGTON—Further plans for cooperative development of Latin American forest resources are being made at a meeting at Lima, Peru, November 14-20, under auspices of the Food and Agricultural Organization of the United Nations, at the invitation of the Peruvian government. The session is giving further consideration to establishment of a Latin American Forest Research and Training Institute; standardization of nomenclature for tree species and sawn lumber; markets for Latin American timber; forest development and industrialization plans; forest products statistics.

CONVERTERS

New Tubing Machine for Read

BOSTON—H. A. S. Read, Inc., Boston, will be able to serve customers with machine-made shipping bags of even the largest sizes early in 1950 when a new tubing machine having an overall capacity of a tube 84 inches wide by 250 inches long is installed.

The firm will shortly move into larger quarters on North Beacon Street, Allston.

JAMES W. KANE

—appointed general manager of operations of the Seaboard Container Corp., Bristol, Pa. . . He will direct the company's operations at Reading, Pa., mills and at the fabricating plants at Bristol and Newark, N. J., making his headquarters at Bristol. . . Mr. Kane was formerly eastern division plant manager for the Container Corp. of America, where he served for 33 years. . . C. Warren Apgar, previous vice-president in charge of operations at Bristol, is retiring from active service after 20 years with Seaboard. Mr. Apgar will continue with the firm as consulting engineer.

Utica Firm in New Hands

UTICA, N. Y.—The Utica Box Co., Inc., was purchased recently by a group of local business men. Directors of the new company, which will continue to do business under the same name, include Martin P., Forte, Theodore Foster, 2nd; S. William Foster, J. Theodore Cross and G Harold Stark.

The interests of Warren D., Armstrong, president and general manager, and James S. Kernan, secretary-treasurer, and associates were purchased.

Three New National Veeps

LONG ISLAND CITY, N. Y. — Lester R. Edwards, president of the Northeastern Container Corp., Bradford, Pa.; C. G. McLaren, vice-president and general manager of the National Container Corp., of Wisconsin, and George J. Schneider, vice-president and general manager of the National Container Corp., of California have been elected vice-presidents of the parent company, the National Container Corp.

Burt Sells Watertown Property

WATERTOWN, N. Y.—The three-floor plant at 203 North Hamilton street has been sold by the F. N. Burt Corp., paper box manufacturer, to the F. A. C. Realty Corp., headed by Mrs. Lucy D. Capone, wife of Joseph J. Capone. The Burt firm recently discontinued operations in this city.

Safety Achievement Certificate

TAYLORSVILLE, N. C. — Southern Paper Box Co., Inc., received the Department of Labor's Certificate of Safety Achievement in September in recognition of its outstanding work in accident prevention in 1948.

FTC Container Hearings, Portland, Ore.

WASHINGTON—Hearings in the Federal Trade Commission's complaint against the Container Mfg. Co., St. Louis, and others, were scheduled for the week beginning November 14, at Portland, Ore.

Redway Amer. Paper Goods Co. Pres.

KENSINGTON, Conn.—Albert S. Redway, has been elected president of the American Paper Goods Co.

SUPPLIERS

Prat-Daniel Corp., East Port Chester, Conn., reports that a longer tube of relatively small diameter and having just one carefully proportioned inlet slot for flue gases, forms the basis for a new tubular dust collector design, Valmont Type S. By introducing the gases in a deep, narrow ribbon, this new inlet slot materially reduces the horizontal distance a particle must travel before meeting the precipitating wall. In the time required for the gases to travel the length of the tube, it is claimed that a higher percentage of fine particles

will be collected. The center outlet tube has been reduced in size to more closely approximate the center of the dust-free vortex produced by the whirling gases in the cyclone. In this new Valmont Type S collector the tubes are nested close together, so that gases are guided to the inlet slot by the contour of the adjoining tube. This sets up an "S" shaped path for gases, from which the model takes its name. For full details, request Bulletin S-250-V, direct from the manufacturer.

F. A. Ringler Co., New York, reports recovery of the world-renowned Dornbusch library of 30,000 original grains and designs used by fabricators of paper, metal foil and other materials. These graining patterns had been reported destroyed by Allied bombing during World War II. Reporting the find to Joint Export and Import Agency officials in Frankfort, the Ringler organization obtained sole Western Hemisphere sales rights to the Dornbusch graining plates and graining machines. Sample swatches and impressions of the patterns will be available to manufacturers as either engraved steel rolls or electrosteel plates. The newest Dornbusch development is a radically designed and highly efficient new roller embossing machine, and a combination calender and printer that grains, tips or inlays.

Hercules Powder Co., Wilmington, Del., reports that expansion in sales and development activities of CMC cellulose gum has brought about two new assignments in personnel here. Effective December 1, Leland H. Burt will be supervisor of CMC development and Werner C. Brown will be supervisor of CMC sales. Hercules CMC, also known as sodium carboxymethylcellulose, can be readily dissolved in either cold or hot water to form colloidal and highly viscous solutions possessing marked suspending, thickening, stabilizing, and film-forming properties.

American Brake Shoe Co., New York, has named William C. Bruton district sales manager of the American Manganese Steel Division and Robert H. Elem Pacific Coast manager of the welding products department. His territory is the Pacific Northwest including the Yukon Territory and Alaska; his headquarters is at the Division's plant in Oakland, Calif. Also, William J. Grant, manager of Southern sales for the National Bearing Division. Mr. Grant's headquarters will be in the Southern States building, Richmond, Va.

Carpenter Steel Co., Alloy Tube Division, Union, N. J., is producing flexible stainless steel hose commercially in a highly corrosion-resistant alloy, Carpenter Stainless No. 20. Until now, the firm's flexible stainless hose has been available only in conventional analyses such as Types 304, 316 and 347. Size range of flexible hose made from Carpenter No. 20 is from about 1" I.D. to 2⅝" I.D., in various gauges. No. 20 provides corrosion resistance in sulphonation and other processes which cause the formation of sulphuric, formic or acetic acids and other highly corrosive agents. Fittings such as standard pipe size nipples, etc., can be welded to the ends of Carpenter Stainless No. 20 flexible hose, or the hose ends can be provided in non-flexible standard tube sizes for use with flanges, etc.

D. J. Murray Mfg. Co., Wausau, Wis., recently completed a 12-ft. diameter by 45-ft. long barking drum for As Follum Fabrikker Hoenefoss, Hoenefoss, Norway. The shipment consisted of three large carloads and was loaded on the S. S. Hemsefjell. Captain G. Olsen of the Hemsefjell on November 3 was host at a dinner aboard ship to F. C. Boyce and C. E. Staky, president and vice-president, general manager, respectively of the Murray company and to executives of several neighboring Wisconsin firms.

Dow Chemical Co., has concluded a long term lease with the South Carolina State Ports Authority, Charleston, S. C. The Authority announced recently it will construct a $100,000 plant at its terminal here for the storage and handling of liquid caustic soda for the district throughout the Southeast. Under the lease Dow Chemical Co., will bring the chemical into the port in special tankers from its Freeport, Tex., plant to use the facilities. Construction of the plant will begin at once and it is expected to be completed by the first of the year.

Chas. A. Krause Milling Co., Milwaukee, has named Willis G. Sullivan executive vice-president and general manager. Mr. Sullivan is a widely known Milwaukee corporation lawyer. He has been identified with the Krause company as legal counsel since 1931. A director for several years, he was named secretary last spring.

Bagley & Sewall Co., Inc., Watertown, N. Y., is building a 130-inch Fourdrinier paper-making machine designed to produce parchments and glassines and having a capacity of about 800 feet per minute, for delivery next June or July to the Cellulosa d'Italia "Celdit," Rome, Italy.

Bell Asbestos Mines Ltd., Thetford, Que., has construction well advanced on a $200,000 plant extension which will be of two stories, 13,500 sq. ft., reinforced concrete and brick, with the new unit accommodating dryhouse, locker room, showers, cafeteria, and engineers' office.

Warwick Wax Co., Inc., Long Island City, N. Y., subsidiary of Sun Chemical Corp., has named two new exclusive distributors for its microcrystalline mekon waxes, emulsifiable cardis waxes and sugar cane wax: The E. S. Browning Co., division of the Innis Speiden Co. (California, Oregon and Washington) with warehouses in Los Angeles and San Francisco; and L. C. Morris Co., (Georgia, Florida, Alabama and Mississippi) with a warehouse in Atlanta.

Fairbanks, Morse & Co., Chicago, has named Russell A. Stevens, former Diesel department manager, Los Angeles branch, manager of the Boston branch house, succeeding V. O. Harkness, now Diesel sales department manager for the Boston area.

Dr. Edwin L. Gustus, vice-president of Bjorksten Research Laboratories, New York, has just returned from a trip to Mexico and Cuba. His itinerary included the west coast of Mexico as well as sojourns in Mexico City, Merida and Havana.

Burtonite Co., Nutley, N. J., has named Burton H. Greenwood, for more than a quarter-century actively identified with the animal glue and gelatin industry to direct its sales and technical activities.

Hoosic River Flood Control

NEW YORK—H. N. Weir, president of the Noble & Woods Machine Co., Hoosick Falls, N. Y., wrote to *Paper Trade Journal* on November 7: "I noticed your news item in the October 13 issue reporting the flood control appropriation for North Adams and Adams, Mass. For your further information I am enclosing a copy of letter recently received from the U.S. Army Engineers concerning the Hoosick Falls project."

The letter Mr. Weir received, signed by W. W. Wanamaker, Colonel, Corps of Engineers, District Engineer, New York, N.Y., read:

"I am in receipt of your letter of 24 October 1949, pertaining to the Federal project for flood control of Hoosic River at Hoosick Falls, N. Y., in which you request information as to my plans for proceeding with the project in view of availability of funds for the first stage.

"An initial appropriation of $350,000 to initiate operations on the Hoosick Falls flood control project has been made by Congress under the Civil Functions Appropriation Bill H.R. 3734, approved on 13 October 1949. The work proposed under this initial appropriation consists principally of the removal of White Dam, excavation of the channel upstream of the dam (Church Street) for a distance of about 700 feet and construction of a concrete wall along the left bank (Mechanic Street side) for a length of about 700 feet above Church Street.

"Formal assurances of local cooperation for the project were executed by the State of New York in 1945. These assurances, which were based upon plans made prior to the severe flood of December 1948, will require some modification in view of the revision in plan which now provides for protection against a recurrence of this flood. Negotiation with the State of New York for modification of the terms of local cooperation will be initiated very shortly.

"Revised detail plans for the first stage of the project have been started. Contract plans and specifications should be completed by 15 January 1950, and it is expected that the contract for initiation of the project will be awarded and actual work commenced by 1 March 1950."

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The Influence of Soaking on Tensile Strength of Wet Strength Paper

By
OTTO BRAUNS
Swenska Träforskningsinstitutet, Drottning Kristinas väg 61, Stockholm, Sweden

In the late 1930's it became evident that there was a great possibility of using water soluble urea-formaldehyde resins in the manufacture of paper and cardboard to obtain higher wet strength in the finished products. During 1943, interest developed in the use of melamine-formaldehyde resins which on account of their positive charge could be deposited on the fibers without the use of alum.

The development of this new technique went ahead fast, especially because of interest from military sources and great improvements were made in the time before the end of the second world war. There is no doubt that products of wet strength paper and cardboard will be made in great quantities for consumers, who are interested in these, for use in packing and containers. Addition of small quantities of resin to paper yield other quality improvements than increase in wet strength.

The production of resin treated paper and cardboard in the United States has recently been quoted as 360,000 tons per year *(1)*.

Several factories in Sweden are now making wet strength paper and increased production can be expected, especially if the problem of disintegrating old resin treated paper can be solved satisfactorily.

Much work has been done in order to understand the technique involved in the manufacture of the resins and their use in the paper industry. This can be seen from the great amount of literature in this field. In a comparatively short time more than 100 papers and books have been published on this subject. The work done on testing methods seems, however, to be rather scarce. Methods of testing wet strength paper have been found, but the literature only shows a small amount of experimental work in this field. TAPPI's plastics committee some years ago discussed not only what is meant by wet strength paper, but also details of the testing methods *(2)*. This committee has suggested the following definitions: "a wet strength paper product is one which when completely saturated with water has a tensile strength which is greater than 15 percent of its dry tensile strength, both tests to be performed according to the appropriate TAPPI standard methods. Complete saturation is defined as being exposed to water for such a length of time that the paper product is apparently wetted throughout its structure and does not lose further strength upon continued soaking."

This definition did not entirely satisfy those present at these discussions but the author does not know whether they later on came to any other conclusion.

This work is aimed at examining this question and publication of the experimental material which could be used in changing the above definition.

The paper manufacture may be satisfied with an acceptable way of testing the paper, but he also wants specifications as to the time after the paper is manufactured, when the test should be conducted. In this way it would be necessary to specify the method of accelerated laboratory cure of paper samples.

Our incomplete theoretical knowledge about the way in which the paper acquires wet strength is perhaps of lesser importance because testing methods must be worked out alone on empirical foundation.

Some view points put forward in this article and only supported with tensile strength figures, could be further proved by the use of other tests. Until the effect of the soaking technique on the water absorption and tensile strength has been fully investigated, other tests have not been employed.

Theoretical Viewpoints

Any specification for testing of wet strength paper must take into consideration the reactions which occur when paper is put in water.

The original structure of the fiber changes during the preparation of the stock and drying of the sheet. The wet fibers, with more or less developed fibrilles, have been compressed to intermediate contact during the shaping and pressing of the sheet *(3)*. As the water is evaporated by the drying of the sheet the hydroxyl groups in the cellulose are liberated from the water molecules, and the hydroxyl groups will then combine by secondary valencies.

We do not intend here to describe the physical-chemical factors involved in the sheet formation, but refer to the modern literature in this field *(4)*.

When paper is soaked in water the water not only goes into the capilaries but also into the micells of the fibers.

It is, of course, not necessary that the water move into every part of the fiber structure in order to cause a decrease in the strength of the paper; however, the mechanical strain imposed on the chemical linkages by swelling will further decrease the wet strength. The water will quickly move through the hollow places between the fibers forcing out the trapped air. After this, a new surface will develop where a slow water absorption will gradually destroy the linkages keeping the fibers together.

Modern theories explain *(5)* that a monomolecular film of water molecules is first absorbed on the surface of the cellulose chains especially in the outer parts of the fibers, whereby a hydrated cellulose is made containing strong hydrophilic hydroxyl groups, which in turn can attract water molecules. In this way the crystal linkages will be broken down. The linkages developed during drying becomes less effective and additional quantities of water can force its way into new parts of the paper.

The swelling and decreasing strength of the wet paper may be taken as a consequence of the continued destruction of the fiber linkages in the sheet, and it is therefore of special interest that the resin treatment decreases the swelling in the fiber *(6)*. It is a possibility that the resin has reacted with the hydroxyl groups in the cellulose, that it in another chemical way keeps the molecule chains in the fiber together, or that the resin without any chemical reaction with the fiber is able to keep these in their original structure *(7, 8, 9, 10)*. Under all conditions the molecules in the fiber will stay in their original positions when little or no swelling takes place, and this will prevent the water molecules from destroying the linking forces. The extent to which the swelling can be diminished is dependent upon the insolubility of the resin. Upon soaking of wet strength paper the decrease in strength is caused to some extent by the steady progress of the swelling and to some extent by the solubility of the resin, especially with low pH values during the soaking period.

[1] Translated from Svensk Papers Tidning by D. Pontoppidan, American Cyanamid Co.

Even if the theory of the water absorption has been dealt with very briefly it may be concluded that the chemical and physical reactions causing the decrease in strength runs parallel with or preceded by a surface activity between the water and the fibers as evidenced by the movement of water into the capilaries. Therefore, the use of a wetting agent has been suggested in order to accelerate the water absorption *(1)*. The water wets a fiber surface very easily when it is not treated, but with resin treated paper it becomes a problem to help the water pass the resin and make the passage into the capilaries.

Wetting agents contain both hydrophilic and hydrophobic groups in the molecules. The hydrophobic groups in the surface area are turned against the air or the cellulose, which on the other hand, means that they will try to escape the water.

The surface tension is made up of all the forces with which molecules of liquids attract each other. The wetting agent molecules will decrease this tension, making it easier for the water to penetrate into the cellulose surfaces.

Considering the cavities in the paper as capilaries the following formula can be applied:

Capilary Pressure $P = 2\alpha \cos \Theta = \text{dynes/cm}^2$
Where α surface tension dyne/cm
Θ contact angle
r capilar radius
Θ can be explained as the angle between the air-water or cellulose-water interfaces.

It can be seen that with constant capilary radius the capilary pressure will increase when the surface tension and cos Θ increase. Increase in cos Θ means decrease in Θ and an effective wetting agent must therefore be able to decrease the contact angle faster than the surface tension.

It is important to remember that solutions such as these do not behave in the same way as distilled water.

The wetting agent can, for example, be adsorbed more tightly to the cellulose than the water molecules and can perhaps react chemically, in another way than water, with the groups in the cellulose. Several hundred wetting agents are now at our disposal *(11)*. They are often high molecular alcohol sulfonates or sodium salts of dibasic acids and alkyl aromatic compounds. In water solution they become positively charged metallic and negatively charged alkyl sulfate ions, which will orient themselves at the surface. These compounds are called anion active. Other wetting agents can produce surface active cations, these include quaternary salts of high molecular amines.

Wet Strength Testing

Testing of wet paper has been dealt with by committees from TAPPI in U.S.A. and PMA[2] in England. Some tentative specifications have to a certain extent been published *(12, 13)*. A paper by Brecht published recently reviews some studies of methods and equipment for these tests *(14)*. Special information about soaking technique has been described by Noll *(15)*.

These methods are supposed to be generally used to determine the water absorption and wet strength of commercial grade paper, untreated as well as treated with resin. It is suggested that the soaking should be done in a way closely resembling the end use of the paper. This will of course make it very difficult to establish any practical specifications. It is important that specifications are established even if they vary with the quality of the paper. TAPPI's tentative method *(12)* leaves room for this kind of variation. As an example, the difference between "normal" and "ultimate" wet strength is clearly made. The "ultimate" wet strength is obtained when the paper has been in the water for a sufficiently long period of time. It is up to the individual to establish the right soaking time by running continuous tests for a period of time up to 24 hours. The normal wet strength can be defined as the properties which the paper will exhibit after soaking to a degree closely resembling the conditions involved in practical use. This test will be very difficult if not impossible to make in the laboratory.

A paper handkerchief is only used for a few seconds, whereas a paper bag often must endure wet conditions for a long time and sometimes drying and soaking in succession. TAPPI has only so far established soaking times for two paper qualities, handkerchiefs and photographic paper. The times for these are respectively 15 ± 3 seconds and 20 ± 2 minutes. If the tests are carried out using these times, the results will show the normal wet strength for papers. While TAPPI only has specified the soaking time and the temperature of the water (23°C. ± 2°C.), PMA has suggested that the water used for the test must have a pH in the 6.5-7.5 range and not contain more than 500 PPM of dissolved solids. A lower temperature is also suggested (20°C. ± 2°C.).

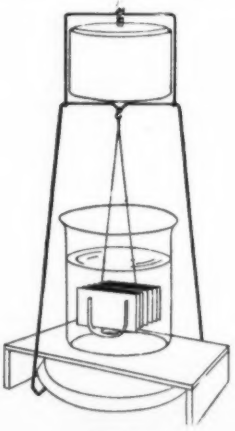

Figure 1.

The Swedish method for testing of spinning paper *(16)* uses a 5-second soaking followed by the tensile strength tests after specified time intervals. This will, of course, not represent the normal wet strength of the spinning paper, which is soaked under quite different conditions.

The apparatus *(Figure 1)* made by J. M. Finch and adopted by both TAPPI and PMA is very useful for testing of "normal" wet strength, especially when the paper is thin or not too strong. When the paper requires long soaking times, the equipment will be tied up for this purpose, and it does therefore not seem too satisfactory for this kind of testing.

The Type of Paper Used in This Study

This work deals only with the influence of soaking on the tensile strength tests. The paper used has been treated with resin or a resin-glue mixture in order to get good wet strength. Most of the paper is of the wet strength type commercially made in Sweden. Non-resin treated paper is used as a control. In *Table I* the different paper qualities have been classified with respect to strength and other properties in dry condition in order to make the study as complete as possible. All the papers, except the two shown in the table, were three months old before the tests were conducted and variations caused by long term curing will therefore be very small. Special consideration has been given to the soaking technique.

Experimental Technique Used in Soaking

In different plants the time used for soaking will vary as much as from 15 minutes to 24 hours. The criterion used in selecting the soaking time was in most cases the wish that the paper should be thoroughly wetted, and only secondary consideration was given to the conditions under which the paper would be used.

It was desirable first to obtain information about the nature of the water absorption for later use in working out the laboratory technique for the wet strength test. Quite a few experiments had to be carried out to obtain this information, using the apparatus shown in *Figure 1*.

Thin sheetmetal is bent to form a small crib to hold pieces of square paper a few millimeters a part. The crib is suspended from a fine metal thread in the left part of an analytical balance. Small weighed pieces of paper are placed in the tared crib and this is then lowered into a beaker partly filled with water. The apparent weight in water of the paper and trapped air is measured at certain time intervals. Air from the paper will form bubles on its surface and these must be released before every reading, either by lifting the paper out of the water or by shaking it against the side of the glass.

[2] Paper Makers Association.

Table I

NUMBER	TYPE OF PAPER	m^2 WEIGHT	RESIN TREATMENT	RESIN QUALITY	TENSILE STRENGTH DRYED PAPER kg With	Cross	BREAKING FORCE	FOLD ENDURANCE KOHLER MOULIN With	Cross	THICKNESS mm.	POROSITY Sec/100cm.
A	MG Kraft	40	0.4% Rosin	Rosin	7.48	2.89	2.32	1.633	705	0.0622	72.3
B	MG Kraft Wet Strength	40	2% Urea 0.4% Rosin	Aerolite 70	7.37	3.37	2.60	2.095	1.372	0.0637	74.0
C	MG Kraft Wet Strength	60	3.5% Urea 0.56% Rosin	Aerolite 70	9.13	5.94	3.90	2.297	1.493	0.0818	42.1
D	Spin Paper Wet Strength	40	2% Melamine	M-100	7.37	3.32	2.44	1.806	1.729	0.0652	26.4
E	Grease Proof	40	Not Treated		4.47	2.34	1.43	788	412	0.0590	265.8
F	Grease Proof Wet Strength	39	Melamine	M-100	5.29	2.47	1.59	2.002	503	0.0537	406.4
G	Kraft Liner	250	2% Melamine	M-100	23.7	15.0	10.3	3.324	3.661	0.391	44.8
H	Writing Paper (Sulfite + Aspen)	100	2-2% Rosin 6% China Clay	Rosin (Beycid Glue)	8.2	3.98	2.18	19	13	0.1323	191.0
I	Cardboard Wet Strength 80% Groundwood 20% Sulfite	508	0.66% Urea	Aerolite 70	17.0	8.9	3.23	-	-	1.056	28.0
K	Handtowel Paper	70	Not treated		-	-	-	-	-	0.20	-
L	Handtowel Paper Wet Strength (57% Sulfite 43% Groundwood)	60	1.5% Melamine	M-100	0.97	0.74	0.43	-	-	0.14	0.9
M	Pure Rag Paper	80	2% Melamine	M-100	12.4	5.90	3.77	2.321	508	0.110	425
N	MG Kraft Wet Strength	47	2% Melamine	M-100	5.88	3.67	2.20	2.239	1.152	0.064	74.1
O	MG Kraft Wet Strength	47	2% Urea	Casco	6.09	3.45	2.08	1.835	1.219	0.067	31.4

The decrease in the apparent weight with time will be a measure of the absorption of water. It is not possible to measure the volume of paper and air before the experiment and the final value recorded will therefore be the volume of the paper fibers themselves which should be satisfactory for this purpose.

Series of experiments carried out with the same kind of paper by different individuals show the same principal results, but no one can expect the curves to be identical because of differences in the commercially made paper. Compared to other methods *(14,15)* this method seems more accurate.

The specific gravity of cellulose can be determined without swelling, in liquids like benzene or toluene and also by using helium. Furthermore, it is possible to get the crystal structure of the cellulose and the volume of the elementary cell. When the number of anhydroglucose groups in the cellulose molecule also are known the specific weight of the crystalline cellulose can be determined. Paper is, of course, not identical with crystalline cellulose and results obtained by using Archimedes principle on different kind of cellulose will vary. The specific gravity values will be between 1.51-1.56 *(17,18)* which will give a specific volume of about 0.65.

Use of the technique described here will yield higher values, probably caused by the fact that air is still entrapped in the fibers. This was later shown by placing the beaker with crib and paper in a dessicator which was put under vacuum.

By weighing afterwards a low value of 0.58-0.61 was obtained for all kinds of papers tested. From a practical standpoint this will probably be of little importance since paper will not normally be used under vacuum conditions. These experiments will, however, show that paper can be soaked in ordinary water for a long period of time without the water penetrating all the pores. As long as this is true it should not be necessary to test wet strength paper under the false pretense that the soaking should be complete. If laboratory standards must be considered equivalent to the practical use of the paper, it is very important that the soaking has reached an acceptable value but whether or not air still is left in the fibers should not be taken into consideration. The degree of soaking need not be the lowest value, but it should be chosen in such a way that it will not fall on the rapidly decreasing part of the curve.

For the first half hour the water penetration will be very rapid for all kinds of paper and thereafter only increase slowly. Some papers will after one hour have already reached maximum penetration, others will take several hours to reach that point.

Different values (point where penetration is almost complete) will be obtained from different papers but these will after a sufficiently long time be constant. *Figure 2* illustrates this by giving the relation between soaking time and specific volume. The experiments were carried on for another four days without any noticeable difference.

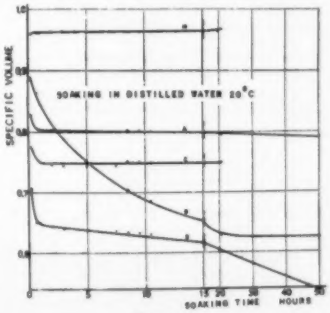

Figure 2.

It is important to note that these experiments were not carreid out with scientific precision. It was also impossible to take the slow but continuous reactions between the cellulose and water into account. For example, the swelling and with that the change in the volume of the components in the system. Attention should, however, be drawn to the possibility that fiber fragments might have loosened from the paper.

Water Absorption by Addition of a Wetting Agent

In *Figure 3* is shown a series of water absorption tests on a number of different papers. The test has been discontinued here after 2-3 hours. The top curves were obtained by the use of *distilled* water at 20°C. while the lower curves show the absorption when 0.3% of a wetting agent "Sandopan 15" is added to the distilled water. Sandopan 15 contains 15% sulfonated fatty alcohol and about 85% sodiumsulfate and gives the solution a pH of around 10.

It can be seen that it is more difficult to get an effective soaking when only distilled water is used. A constant value will be obtained for the thinner grades of paper after 20 minutes, but the value is so high that it is very probable that the thorough soaking has not been completed in the time shown in the diagram. It is evident that the sizing, thickness and density of the paper will have a large bearing on the soaking, but the curves show that the addition of a wetting agent will make these differences very small. If the sqaking time only had to be chosen with respect to water absorption then the curves show that when "Sandopan" is used a time of less than 2 hours is sufficient for every kind of wet strength paper. Sandopan has a strong buffering action and the pH value will therefore be constant during the soaking.

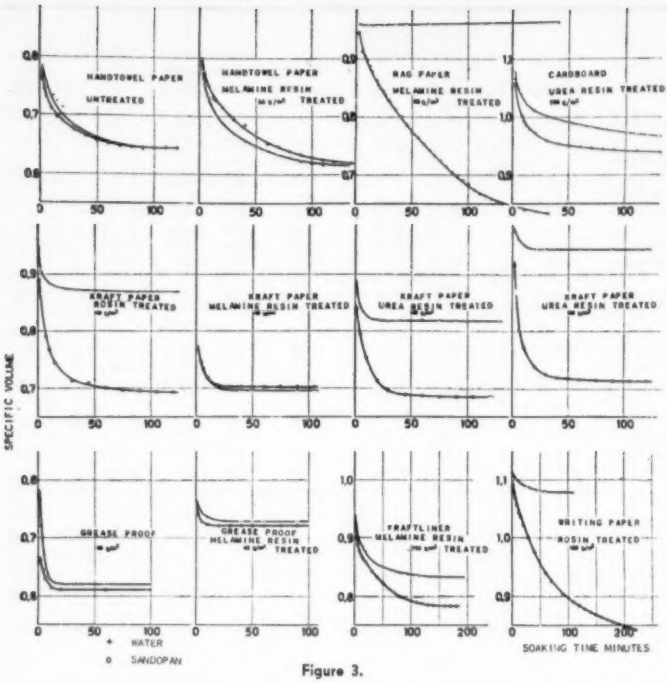

Figure 3.

Figure 4 shows the influence of the concentration of the wetting agent on the water absorption. As it will be seen 2-3 thousandths of a percent seems in the right range, and the water will at this concentration be

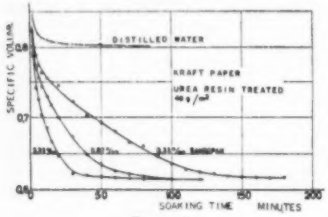

Figure 4.

quite opaque. No other conclusions will be made before the strength tests have been made. Sandopan is an anion active compound. The presence of Na_2SO_4 as such does not seem to influence the water absorption as shown in *Figure 5*, which also shows the effect of a number of other wetting agents, Wesit (Wolfs Chemicals, U. S.A.) and Aerosol. The Aerosol used was a cation active chloro-substituted amine. A water solution containing 0.05% fatty alcohol-sulfonate gives as low values as benzene in which the paper does not swell. A solution containing half water and half alcohol is rather effective but is perhaps difficult and expensive to use in a routine testing laboratory. The surface tension of the different solutions has been measured with a tensiometer and the values recorded in *Table II*.

Table II

Figured	*Surface Tension dynes/cm.*
Water	72
Ethanol 50%	29
Aerosol 0.05%	43
Wetsit 0.05%	44
Sandopan 0.33%	52
Sulfonated fatty alcohol	54

The shape of the curves does not correlate with the surface tension, but the direction of the contact angle as shown earlier has an influence on the water penetration. It is possible that alcohol and sulfonated fatty alcohol will prevent the swelling. As shown

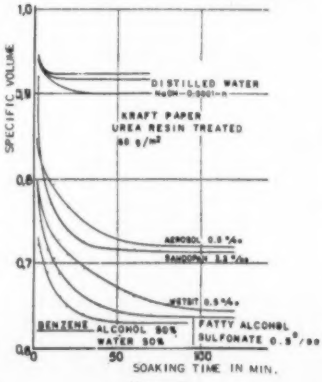

Figure 5.

later the strength is higher when a wetting agent is added.

When the fiber is swelling, as it happens in water, higher values for specific volume will be constant if the paper is first placed in a solution containing sulfonated fatty alcohol for one hour, and afterwards in distilled water for several days.

Other Means of Evaluating the Water Absorption

There is a possibility that other tests could give a better judgment of the necessary time for soaking a paper before testing it. Contact angle testing after TAPPI *(19)* is a way of determining the resistance to wetting but as shown in *Figure 6* it is not

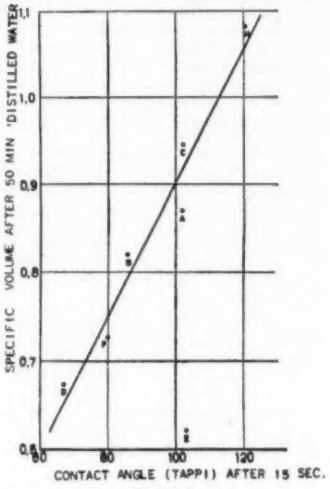

Figure 6.

always possible to correlate this test with the direct method.

A number of the points are not situated in the vicinity of the straight line, for example, this is true for cardboard. Contact angle testing has, on the other hand, the advantage that the wetting ability can be examined one side at a time to judge the wetting time. Noll *(20)* has suggested a kind of floating test *(Figure 7)*.

This test measures the time which a small circular piece of paper can float on the water surface. For several papers this time will be very long and a wetting agent is therefore recommended. This test does not seem suitable.

Figure 7.

Cobb and Lowe *(21)* have worked out a water absorption test which is accepted as one of TAPPI's standard methods *(22)*. If the swelling, capilary structure and chemical reactions of the paper with the water are not taken into consideration, the best way of determining the water absorption seems to be an evaluation of the specific volume in the water. It now remains to determine whether this has any influence on the testing of the wet strength.

Wet Strength and Water Absorption

So far it has been shown that the water absorption will vary greatly for different papers. Impregnation with small quantities of rosin will delay the water absorption considerably and could easily be used to obtain high wet strength in the laboratory if the testing was carried out in a short interval of time. It is important that a paper towel, for example, besides having good wet strength in the time it takes to dry the hand, also must be able to absorb the water satisfactory. It is not possible here to use rosin or a rosin sizing technique that will give a rosin sized writing type of paper. If the determination of specific volume can be a criterion for the water absorption of the paper, it is of interest to note how the strength will vary after the same time schedule.

Figure 8 shows how a 40 gm./sq.

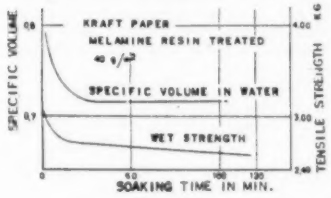

Figure 8.

meter paper with 0.4% resin will run. It takes half an hour to effect the complete absorption of water. The wet strength has decreased rapidly for the first 10 minutes, but straightens out to a near linear curve. A constant value on the wet strength cannot be reached. Later on in this article this will be dealt with in greater detail.

Figure 9 shows a handtowel which for some reason has been treated in

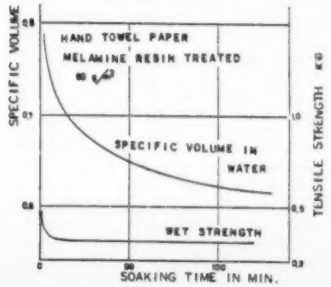

Figure 9.

an unusual way. The wet strength here has decreased substantially after 5 minutes and is constant after about 15 minutes. The specific volume in water keeps decreasing for 2 hours before it becomes constant. But no one will dry their hands for such a length of time. The wet strength is good but the other test shows a paper with poor water absorption.

A third example, melamine resin treated kraft liner, is shown in *Figure 10*.

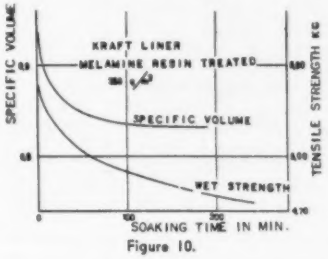

Figure 10.

The wet strength is steadily decreasing and has not even after 10 days become constant. Information about this paper points out that it does not contain usually used resin. The water absorption curve shows the same grading as the one for the handtowel. The difference in weight for these two papers is 250-60 gm/m² and the slow water absorption can therefore not be caused by the difference in weight as compared to other papers.

If we choose another 60 gm/m² resin treated paper as shown in *Figure 11*, then the wet strength will keep de-

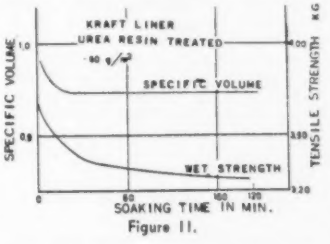

Figure 11.

creasing while the specific volume will be constant after 25 minutes. This last paper has been tested up to 10 days and the wet strength has decreased all the time.

This paper has also been tested under vacuum *(Figure 12)* where the strength will be lowered considerably and not coincide with the value ob-

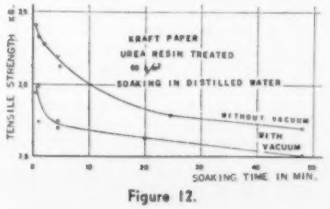

Figure 12.

tained without the use of vacuum. The method involves risks, damage to the fibers and cannot be recommended.

Figure 13 shows the same paper which has been treated with both urea and melamine resin. The initial results

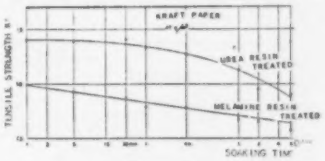

Figure 13.

are in favor of the urea, but a week's soaking shows that the melamine gives a more slowly decreasing wet strength.

Interpretation of Results

One opinion would be that the papers, whose wet strength keps decreasing, are not wet strength in the absolute meaning of the word. Only the paper towel showed a constant value at a time where it still absorbed more water. For this study it was not possible to obtain very many different kinds and grades of wet strength paper, otherwise it would have been suggested that a relative short soaking time would be satisfactory for a "first test," and that a control would have to be made after 24 hours to prove that the paper really was wet strength. The decrease in strength in this period should be reported as an addition to the test result. As seen it is not sufficient only to make the test after a certain long time. In TAPPI's method the paper has to be tested after a certain time schedule until the final strength is reached. This is perhaps the safest way, but it consumes a great amount of time, because in our estimation it is necessary to carry out more than 25 separate tests in order to obtain a reliable value. Soaking times involved in first rapid decreasing part of the absorption curve, are not desirable. It seems that this part of the study reveals that the water absorption cannot be correlated with the wet strength. It is obvious that other factors than the amount of water in the sheet will influence the result. It seems, however, unnecessary to use wetting agents and their use will as later shown bring about new complications. The water absorption tests as here described can possibly be of interest from other viewpoints, for example, for testing of a paper towel. For this reason it has perhaps been of value that experiments of this nature have been carried out.

The Influence of a Wetting Agent on the Wet Strength

It has been pointed out that some resin treated papers will continue to lose their strength. It was noted already in the first experiments with Sandopan that the addition of this wetting agent would keep the strength at a high value. *Figures 14 and 15* show

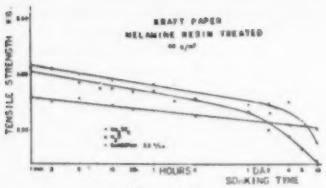

Figure 14.

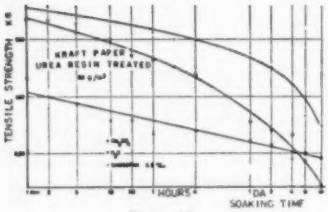

Figure 15.

this for both urea and melamine resins.

In the beginning lower values are obtained with Sandopan which possibly could mean that the water penetration after all was so effective that the whole slope of the curve would be shifted. *Figure 16* shows the same conditions for Kraftliner.

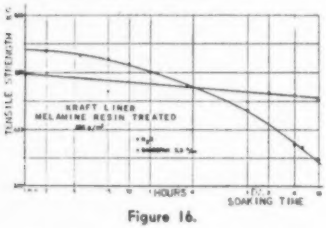

Figure 16.

The curves have been very accurately controlled using up to 50 tests for several of the points and carried out by different persons. A solution of sodium sulfate equivalent to the sulfate concentration in Sandopan, has been tested and the results show *(Figures 14 and 15)* that the effect is not caused by this salt, although it gives other values than distilled water.

If the wetting agents should be usable for the purpose of speeding up of the water absorption it must be expected that they will do this to different extents, and that the time used to reach a constant value of specific volume will be a criterion for their effectiveness.

The question at this time is then how the strength will be with the different wetting agents. This is shown in *Table III* which also shows the strength figures for soaking for the same length of time for all the wetting agents.

In the first case varying values were obtained and they are plotted in *Figure 17*. The scattering from the straight line can be caused by differences in pH and surface tension. Different values were even obtained, when the same time was used for all the wetting agents, which point to great caution if these are used. It will in any circumstance be neecssary to ***standardize*** the concentration. This study does not include work of this nature.

Table III

Wetting Agent	pH	Soaking to Constant Value: Time Min.	Soaking to Constant Value: Wet Strength kg. (M.D.)	Wet Strength (M.D.) kg. After Soaking for 60 Min.
Distilled Water	6.8	12	3.43	3.01
NaOH 0.0001-n	10.0	40	3.38	3.19
Na_2SO_4 2.55 g/1	6.0	15	3.60	3.29
Aerosol 0.5%	5.3	80	3.17	3.04
Sandopan 3.0%	10.2	50	2.80	2.78
Wetsit 0.5%	6.8	100	2.83	2.92
Pure Fatty-Alcohol Sulfonate 0.5%	6.5	70	2.92	2.90
50% Ethylalcohol by Volume in Distilled Water	7.4	50	3.36	3.31

Each value in *Table III* represents the mean average of 25 tests. The test pieces were cut out of 25 different sheets of the same paper. The mean deviation of the values was between ± 0.03 and ± 0.05. The mean deviation for the single test was between ± 0.11 and ± 0.26.

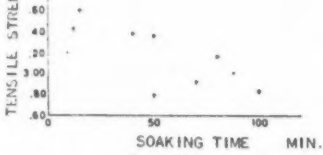

Figure 17.

A mean deviation of this magnitude is ordinary for tests of wet strength paper with a Schopper apparatus. These experiments show that the use of a wetting agent will give unreliable results and does not resemble the conditions under actual use.

pH of the Soaking Agent and its Influence

Different wetting agents will give more or less buffered solutions and it is desirable to examine the influence which the pH of the soaking liquid might have.

The pH value of distilled water will very easily be changed. When a kraft paper is soaked the pH will shift towards the alkaline side. A solution of Sandopan will not simulate actual conditions any more than distilled water. It is not possible to take into consideration the changing end uses of the paper but it is of value to examine the pH variable in the testing technique. For this study a buffer solution has to be used. The results shown in *Figure 18*, using a 0.2 molar solution of citric acid, disodium phosphate, was quite surprising but has a natural explanation. This paper contains acid parts and the high pH of the buffer

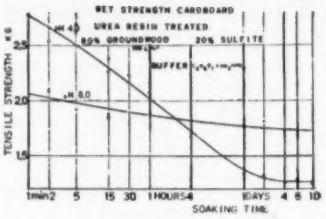

Figure 18.

solution will cause chemical reactions which will lower the initial wet strength. Low pH values will decrease the wet strength by acid hydrolyses of the resin. Over a long period of time the alkaline agent will be preferable because it will tend to slow up the hydrolyses.

The experiments were now extended to cover complete series on other papers. *Figure 19* shows the results for

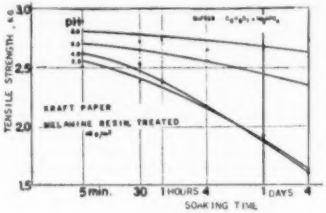

Figure 19.

a melamine resin treated paper and *Figure 20* for a urea resin treated.

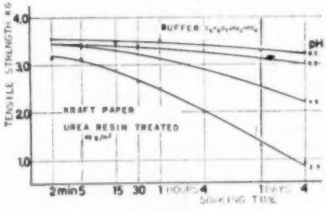

Figure 20.

The problem has now entered a stage where the resin treatment technique is involved. These resins are evidently influenced by the acidity, a fact which also is takn into consideration during the wetting of the paper.

For the same raise in acidity the strength will decrease twice as fast for urea as for melamine treated paper, but this comparison is perhaps not quite correct, since other factors might influence the result.

Some consideration should be given the pH in laboratory tests if the papers examined in this study are representative of wet strength qualities. The best and most constant results are obtained with a pH of 8.

Practical results will vary according to the use of the paper. If the paper, for example, is going to be used as wrapper for soap then these results should be rather reliable, if an alkaline hydrolysis does not take place at high-

er pH values than so far has been examined. The hereto described pH influence does not appear in paper treated with rosin for writing use, the effect can therefore be rtaced to the synthetic resins used.

When resin is deposited on the fibers under a low pH value using acid or alum, this is often described as though the pH value of the paper is on the acid side. In the manufacture of both urea and melamine treated paper, the cure will be faster, when the paper has a low pH value during drying. Steenberg has found *(10)* that a 24 hour baking at 90°C., will give papers treated at different pH values the same cure and wet strength, but at room temperature the cure will be exceedingly slow when a high pH is employed. When wet strength paper is manufactured care must be taken not to get too low a pH value in the stock as this later might cause hydrolylic solution of the resin. A paper made with too low pH will after being stored in a humid atmosphere loose its wet strength instead of undergoing a further cure. We have stored both urea and melamine treated papers over water at 60°C. and found decreased strength caused by the pH.

Influence of Temperature of Soaking Agent

The decrease in strength is caused by a chemical reaction and it is therefore natural that the temperature of the soaking agent can have some influence. *Figures 21 and 22* show this effect.

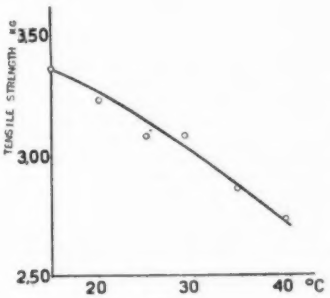

Figure 21.

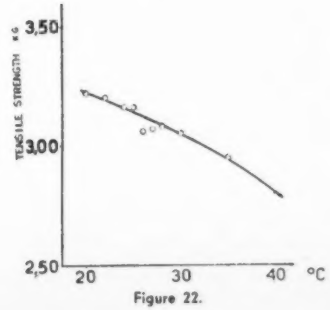

Figure 22.

LIMA CRANE AT WORK IN SOUTHERN MILL

LIMA Type 802 Crane, equipped with a 70' boom and grapple, loading and unloading pulpwood at a large southern paper mill. A LIMA Type 750 Crane equipped with an 80' boom is visible in the background at right.

A difference of 1°C. has no appreciable effect while a change of 5°C. will vary the strength 0.2 kg., which is very small for tests of this kind. The wet strength is often tested outside the conditioned room, and in that case care must be taken to control the temperature.

Summary

The study has shown that the strength of wet strength paper will decrease steadily with soaking. The greater the acidity of the soaking agent the faster the decrease in strength. The use of wetting agents in the soaking are effective but will not give the same results as pure water. The use of wetting agents would have to be standardized, especially with respect to pH value. The soaking time can, of course, be varied depending upon the use of the paper, but times under 1 minute seem unreasonable. A water absorption test as described earlier could be used to judge the appropriate time any particular paper has to be soaked before testing.

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Translated by *D. Pontoppidan*, American Cyanamid Company.

Elimination of Kraft Mill Odors

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The great drawback of any Kraft-paper mill is the nauseating smell of hydrogen sulfide (rotten eggs) and of methyl mercaptan (rotten cabbage) from the manufacturing process. Paper mills in built-up communities might convert to the Kraft process if it were possible to avoid becoming a public nuisance. Some Kraft mills have resisted public demand for odor elimination or control of effluents on the plea that great expense or insurmountable difficulties were involved. One Kraft mill will hestitate for competitve reasons to reduce nuisance conditions unless the Kraft-paper industry generally is going to do so. Analysis will show that the noxious odors can be greatly reduced or eliminated and waste effluents controlled, particularly in a new Kraft mill.

Sources and Strength of Odor

The kind of wood, such as pine or spruce, and the quantity of alkali used in the digesters will affect markedly the quantity of odorous gases produced at the digesters, blow pit, and evaporator condenser, as well as the relative ratios of methyl mercaptan, methyl sulfide, and hydrogen sulfide. Pine will produce more mercaptan than spruce.

The usual range for sodium sulfide in cooking is from 20 to 35 per cent of the total alkali. Best results in recovery of pulp are said to be obtained when the ratio of sulfide to caustic is close to one to two; that is, of the total active alkali, one third should be sulfide. Excessive sulfide causes high sulfur losses and incomplete digestion whereas excessive caustic reduces the amount of mercaptan and causes lower yield and soda pulp. Sulfide can be as low as zero for a pure soda liquor, when objectionable odors will be eliminated, or as high as 45 per cent. Decreasing the amount of alkali will greatly multiply the amount of mercaptan. Reduction of sulfidity in odor to lessen odors could mean loss of the economic advantages of the Kraft process. Maintenance of uniform sulfidity, however, is necessary for the best operating results in the elimination of odor.

Stack gases from the black liquor recovery furnace may contain methyl sulfide, methyl mercaptan, and hydrogen sulfide, but the relative amounts will very with operating methods. One authority argues that the amount of mercaptan present may be neglible. All three compounds are converted to SO_2 by burning. Sulfur-oxide gases and hydrogen sulfide can exist simultaneously in stack gases.

Another source of odors is the waste effluents. Aerobic action on the effluents during sedimentation or their treatment with chemicals to increase rapidity of sedimentation cause the giving off of the characteristic odors.

The threshold for faint or noticeable odors from methyl sulfide, methyl mercaptan, and hydrogen sulfide is very low at about 0.0011 oz. per 1000 cu. ft. or about one part in 1,100,000 parts by weight. Below this ratio, the average person will be able to note little, if any, odor.

Each Kraft paper mill presents a special problem in odorous gases to be controlled or eliminated. Analyses for such gases are not easy. Even the same chemist may report different percentage-composition results for two samples of the same gas. Quantities of gases generated vary with operating methods. Hence the conflicting, published statements as to quantities of gases involved.

The problems in odor removal and control of waste effluents can be handled better if the various sources of odor are considered separately.

Scrubbing Gases

The incondensible gases from the digester relief, blow pit, turpentine condenser, and evaporator condenser may be brought to one central point for scrubbing with weak oxidizing solutions such as sodium hypochlorite, or for oxidation with air, or for burning. The use of a continuous digester would simplify their collection.

Several Kraft mills have eliminated part of the odors by scrubbing. One paper mill uses about 8-10 pounds of sodium hypochlorite per ton of high-grade paper produced with a modified Kraft process. The incondensible gases can be taken from the side of a jet or surface condenser and passed through a fume scrubber that is set in a tank holding the caustic solution.

Scrubbing of the odorous gases with caustic soda is effective for methyl mercaptan but not for methyl sulfide. Sodium hypochlorite is more effective for mixtures of odorous gases. Calcium hypochlorite might also be used. Use of chlorine or permanganate is also possible but expensive.

The chlorine required would be about two pounds per pound of sulfur compounds. It is best used in the form of a sodium or calcium hypochlorite solution. One test showed about 25 lbs. of chlorine needed per ton of pulp produced (stack gases were not included). The odorous gases are easily oxidized to sulfates that can only be disposed of in lagoons. Cost of labor, chemicals, and power might run $100 or more per day for an output of 100 tons of pulp daily.

Activated carbon is prohibitive in cost but is another possibility, probably in the form of pellets, with reactivation by steam at about 900°F. The result is some acid and sulfur. The carbon in the end has to be burned as reactivation finally fails.

One of the handicaps in removing hydrogen sulfide and mercaptans from the waste stack gases is the simultaneous presence of CO_2. It could run from 12-14 per cent to 15-17 per cent by volume and could be scrubbed out with lime water, but the quantity required is prohibitive. The disposal of the resulting, voluminous sludge, furthermore, is as bad a problem as odor removal.

Carbon dioxide is acid and in flue gases is said to react with sodium sulfide and the sodium salt of methyl mercaptan to release hydrogen sulfide and methyl mercaptan respectively.

Several of the oil-refining companies have methods for removing ordors from gases. Investigation of some of them showed prohibitive costs. The main trouble seems to be the large volume of waste stack gases from a Kraft-mill recovery furnace and the low concentration of odorous gases therein.

Oxidation Tower

Messrs. Bergstrom and Trobeck in Sweden have developed an oxidation tower (patent pending) ahead of the multiple-effect evaporator. The black liquor at a specified concentration is passed through heated air for a given interval. The voltatile sulfur compounds such as hydrogen sulfide are oxidized. Sulfur is kept in the liquor and not wasted to the air as nauseating gases, sulfidity of the white liquor is increased, and less lime is required. The method is said to be 90-100 per cent effective on the incondensible gases from the multiple-effect evaporator. It has been applied also to stack gases from the black-liquor recovery furnace where equal success is claimed.

Other experimenters have shown that the sulfide content of such gas decreases rapidly by oxidation when in contact with air.

Inka Tower

Instead of the preceding, an Inka Tower (patented) could be used after the usual precipitator to collect any chemicals, organic sulfur compounds, and SO_2 remaining in the waste gases and thus reduce the odor from the recovery furnace by 90 per cent or more. The gases should pass upward through 4-5 perforated plates on which a mixture of the gas condensate and a solution of NaOH circulates. The excess condensate is pumped automatically to the dissolving tanks or to lime-sludge washing in causticizing. The condensate from the gas has a pH of 2 or 3. The tower has an automatic pH regulator that keeps the circulating liquor

at about 6.5—7.0 by the addition of NaOH.

The claim is made that 8-10 lbs. of NaOH per ton of pulp are necessary in Sweden in order to recover 7-8 lbs. of Na_2SO_4 and 9-10 lbs. of sulfur per ton of pulp. The power requirements for pump and fan are 120 H.P. and the condensate is about 1150 gals. per hour for 100 tons of pulp daily.

The waste gases for 100 tons of pulp daily could be about as follows: 45,000 cu. ft. per min.; 300°F from the precipitator; water content 19 per cent by volume; and CO_2 content 12 per cent by volume. If the waste gas and liquor leave the Inka tower at 110°F and 140°F respectively and the circulating liquor in the heat exchangers is cooled to 106°F on a volume of 58,000 gals. per hour, about 3,800,000 BTU per ton of pulp can be recovered. A heat exchanger could be selected to heat in the summer about 49,000 gal. per hour from 85° to 126°F and in the winter about 27,000 gal. per hour from 59°F to 135°F. The hot water in Sweden is used for washing in the bleaching department. A little exhaust steam could be used to raise its temperature if desired.

The results above, however, are based on gas from the precipitator at 300°F. This temperature, as will appear later, can be increased somewhat with resulting increased temperature in the hot water from the heat exchanger.

Dust or Fume in Stack Gases

Sodium sulphate in the stack gases must be removed if they are to be treated economically for odor removal. Recovery of SO_3 in the stack gases by an Inka tower is desirable as reducing the quantity of salt cake otherwise required. Any dust left in the gases would coat the catalysts for odor removal that might be used and thus reduce their effectiveness.

One study showed that as between rotary-disc evaporators and the spray type, the loss of sodium sulphate was three times as much in the spray-type furnace. Losses in pulp washing, causticizing, leakage, and blowing were otherwise about the same.

Recovery Furnace

The furnace probably should be somewhat larger than the mill's rated capacity as lower production costs are usually sought by exceeding the designed capacity of the furnace. It should not be overloaded and the proper proportions for complete combustion should be provided. At least one boiler manufacturer is prepared to build a furnace that will eliminate hydrogen sulfide if it is correctly operated. References can be found in technical literature supporting the claim that the presence of hydrogen sulfide or methyl mercaptan in its gases can be avoided or reduced to small amounts.

One test showed that forcing a recovery furnace increased the loading of hydrogen sulfide and other sulfur compounds in its gases from 25 to 50 grains per 100 cu. ft.

The usual furnace is operated too hot at the lower level of air inlets in order to avoid the possibility of the fire going out and of the necessity of using supplementary fuel. Black-liquor for stable combustion should be at least 55 per cent solids and not over 70 per cent. Even without elaborate controls, a range of 60-70 per cent solids can be maintained. The higher figure is about the limit for liquor pumps. The black liquor has to be dehydrated first as its water content entering the spray nozzles is often less than 30-40 per cent, but preferably should be 35 per cent. The lower the moisture content, the better the furnace conditions.

Too hot a temperature in dehydrating the liquor means the development of hydrogen sulfide as it forms at 1800°F. The fusion temperature of a solid mixture of black-liquor is 1400°-1600°F depending on its composition. Close control is necessary, therefore, if the formation of hydrogen sulfide is to be restricted. Such control is desirable, furthermore, in order to reduce the sticking tendency of ash above 1300°F. Such ash above 1800°F becomes a layer of slag. Even if temperatures in the combustion zone are 2000°-2200°F, the flue gases as they enter the superheater should be down to 1500°F. This temperature can be affected by too much or too little excess air in the combustion space.

A reducing atmosphere is needed at first in the furnace in order to change as much sodium sulphate in the black-liquor to sodium sulphide as possible and to remove oxygen from the sodium sulfate. Combustion air at the primary air ports should be limited for that reason to about 65 per cent of the theoretical. Gas quantities can be calculated within two per cent of the actual. The dust in the gases should be largely sodium sulphate.

Another test of good operation is the extent to which sodium sulphate in the black-liquor is reduced to sodium sulfide. Normal reduction is said to be 88-92 per cent although 94 percent is possible. Faulty operation will drop the conversion to 75-80 per cent. Recording instruments on air flow at both the upper and lower level of air inlets are necessary, therefore, if the paper-mill's management is to know each day how good the supervision of the furnace operation has been during the previous 24 hours, not only as to slag formation but also as to the elimination of odor. Many paper mills have inadequate data on waste-gas analysis, temperatures, and chemical losses.

Quantities of Stack Gases

Black liquor from the digesters is about 15,000-20,000 lbs. per ton of pulp at 80-85 per cent water. As it leaves the usual multiple-effect evaporator and the direct-contact evaporator, it should be about 55 and 65 per cent solids respectively. The dry solids per ton of pulp produced will run from 2700 lbs. for brown stock to about 3400 lbs. for bleached stock. A short cook will lower the amount and it can be as high as 3800 lbs.

Assuming 3000 lbs. of dry solids per ton of pulp, wet gas at 8 lbs. per pound of dry solids, and gas of 300°F at about 20 cu. ft. per pound of gas, the gas produced will be about 33,300 cu. ft. per min. for 100 tons of pulp daily. Excess air at 33 per cent will raise total gases to about 45,000 cu. ft. per min.

One authority puts the normal excess air at 25 per cent but says the oxygen from reduction of sodium sulphate to sodium sulfide is 3 per cent of total oxygen needed.

The quantity of gases produced should be kept as low as possible by efficient operation of the furnace and by stopping air leakage into the furnace. Reduction of gas volume will reduce the cost of any catalyst chambers that might be used for odor removal. Reduced excess air will also increase the thermal efficiency of the furnace.

Direct-contact Evaporator

The direct-contact evaporators are a source of the odors in the stack gases. It is the black-liquor scrubbing that puts hydrogen sulfide and methyl mercaptan into waste gases from a well-designed-and-operated recovery furnace. Several authorities support this statement.

One test showed that a disc evaporator added about 25 to 40 grains of hydrogen sulfide and sulfur compounds per 100 cu. ft. of waste gases from the recovery furnace.

One approach, therefore, on odor removal is to replace the direct-contact evaporator with larger-capacity multiple-effect evaporator in order to increase the amount of solids in the black liquor from 55 to 65 per cent.

The usual multiple-effect evaporator could be made a sextuple effect with a forced-circulation concentrator. The fifth and sixth cells of the sextuple effect, where the black-liquor would be raised to about 40 and 55 per cent solids respectively, should each have "A" and "B" bodies. Vapor from the "A" body of the sixth cell should go to the "A" body of the fifth cell in order to accumulate any distillation products, which may pass over, in one particular vessel that may be boiled out at any time without shutting down the evaporator. The "A" bodies should have stainless-steel tubes so that boiling out should be infrequent. The concentrator should have larger than usual tubes in order to eliminate tube plugging. This evaporator should deliver black-liquor at 65 per cent solids from weak black liquor at 12-20 per cent solids.

The chemical dust in the gases leaving a cascade evaporator is sometimes as low as about 1.5 grains per cu. ft. The omission of such evaporator will increase the loading of dust in the gases to perhaps 3-4 grains per cu. ft

or even to as high as 7 grains. The dust to be removed by the precipitator and the Inka tower, therefore, will be increased as compared with normal American practice if a direct-contact evaporator were used.

Addition of Moisture

Elimination of the direct-contract evaporator will reduce the moisture content of the gases going to the precipitator below the desirable 19 per cent of total volume. This condition can be corrected by blowing steam at about 350°F or higher into the waste gases. Hot water could also be sprayed in if its quantity were limited in amount so all of it was vaporized. This procedure has been used by several operators.

Determination of the amount of moisture to be added is shown approximately in *Table I*.

Table I

Source of moisture	*Quality in lbs. per minute*
Excess air for combustion in recovery furnace	12
From hydrogen in black-liquor at 3.5 per cent of dry solids of 300,000 lbs. daily for 100-ton mill.	66
From combustion of black-liquor at 65 per cent solids	112
Total available moisture	190 lbs. per min.

Waste gases at 45,000 cu. ft. per minute at 300°F at 19 per cent of total volume for moisture will require about 266 lbs. per minute of moisture. The difference to be added will be about 76 lbs. per minute.

This amount could be added through steam nozzles using exhaust steam at about 55 lbs. gauge. Steam at about this pressure will be needed for the proposed sextuple-effect evaporator and if bled from a steam turbine would be economical in cost.

Another approach would be to use hot water from the Inka-tower heat exchanger. Some experimentation would be needed to get complete vaporization, and to avoid channelization and the building up of deposits. A venturi-type of spray tower or even an Inka tower as one authority has suggested might be used for the application. The objection to this procedure is the large reduction in flue-gas temperature needed to volatilize the water added. Any latent heat in the volatilized water or steam would be recovered largely in an Inka tower beyond the precipitator as it is perhaps 75 per cent efficient in removing heat from flue gases, according to one authority.

Gas air heaters on the boiler for a black-liquor recovery furnace usually reduce the temperature of the gas going to the direct-contact evaporator from 600°-700°F to 450°-500°F. The elimination of that evaporator will make a lower temperature desirable for the gas as it leaves the air heater. The maintenance of 65 per cent solids in the black-liquor will make a lower temperature possible. One boiler manufacturer believes 350°F is feasible, a temperature that is satisfactory for passage into the precipitator without cooling if moisture is not added from water.

The addition of moisture instead of steam to the waste gases will lower their temperature by the heat necessary to vaporize the hot water. At 76 lbs. per min. of water at 150°F, this heat will amount to about 78,000 BTU. The specific heat of the mixture of combustion gas and water vapor will be about 0.3. A flow of 45,000 cu. ft. per min. at 300°F is about 2070 lbs. per min. Hence 230,000 BTU will require a drop in flue-gas temperature of 125°F. This drop is possible by reducing the size of the air heater.

Instrumentation

Uniform operation of the evaporator and furnace will be made easier by furnishing recording and control instruments as follows:

The sextuple-effect evaporator will require more complete instrumentation than is normal. It should include automatic, recording control for both the steam and weak feed liquor; manually-operated boiling-point-rise controller in order to reset steam-flow controller on the first cell as required by outgoing liquor-density recorder with high and low-density alarm; a multiple-recording potentiometer with connections to the liquor in the various cells in order to note progressive fouling of evaporator tubes; and an absolute-pressure controller on the evaporator condenser. As the evaporator tubes foul, the operator will have to adjust the rate of feed of weak liquor to get constant rate of flow to the first cell and will have to control the split feed to the fifth cell at a constant ratio to total flow.

The heat value of black-liquor will vary considerably if pulp is produced from different kinds of wood. It usually ranges from 6000-7200 BTU per lb. on a dry basis before salt cake is added, being high with soft woods and low with increased length of cooking. The reaction of carbon and sodium sulphate in dehydrating black-liquor absorbs about 3000 BTU per lb. of sulphate used. Solids at 65 per cent, however, can be obtained with good supervision.

The recovery furnace should be equipped with flow meter on the black-liquor feed to it as well as recording and controlling thermometers on the liquor-feed heaters. The latter are needed in order that the temperature of the feed may be high enough to support combustion without the use of auxiliary fuel and not so high that chemicals are lost in the flue gases. Mention has already been made of air-flow control to the upper and lower air ports.

Precipitator

The sodium-sulfate dust in the waste gases from the black-liquor furnace carries with it particles of oil or steam in which hydrogen sulfide may be included. The dust from the usual furnace is largely sodium sulfate, with some sodium carbonate and traces of sodium sulfide. The usual electrostatic precipitator that collects 90 per cent of such dust should be replaced with a precipitator that will be about 98 per cent efficient at an increased cost of about 50 per cent excluding erection and foundations. The greater efficiency is justified by increased chemical recovery and reduction of odor. One manufacturer guarantees these efficiencies if the dust content exceeds 1.5 grains per cu. ft. and the moisture content in the gases is at least 19 per cent by volume at 300°F.

The gases entering the precipitator, according to one manufacturer, should be 325-375°F, and leaving will be about 250-275° F. Another manufacturer says entering gases will be acceptable at least as high as 350°F. The higher the exit temperature, the better the performance of the subsequent Inka tower. A high exit temperature, however, requires a high inlet temperature. Too high an inlet temperature such as 500-600°F is said to affect the efficiency of the precipitator but 400°F may be found on test to be acceptable.

The precipitator of one manufacturer has collected from 90 to 140 lbs. of dust per ton of pulp with an average of about 120 lbs. This dust weighs about 9 lbs. per cu. ft. loose and 30 lbs. packed. It is readily soluble in the gas condensate and must be removed above the dew point, usually 135-175°F at point of exit from the precipitator. The make up of salt cake without the use of a precipitator ranged in several tests from 230 to 350 lbs. per ton of pulp, with an average of about 290 lbs. The increased collection of sodium sulfate, therefore, will justify the larger precipitator. It is necessary for the successful use of a catalyst on the stack gases at a later point in the process in order to avoid clogging the beds thereof with dust.

Burning Incondensible Gases

The incondensible and odorous gases from the blow pit, digester relief, turpentine condenser, evaporator condenser, the black-liquor recovery furnace, and waste effluents may all be burned in an oxidizing boiler. They could be burned in the power boiler or recovery furnace. A separate boiler, however, has the advantage that it can be located outside the factory in order to reduce explosion hazards. Explosion dangers should not be serious if good engineering design is used as the burning of gas or multiple fuels in boilers is common. Various interlocking controls will be needed to meet insurance-company requirements. This boiler could be a high-pressure unit in order to fit in well with the power boiler for an economic steam balance.

Burning of the odorous gases pro-

duces some heat of combustion as shown in *Table II*.

The collection of the incondensible and odorous gases involves some engineering problems if explosion is to be avoided and if the oxidizing boiler is to be operated efficiently. The presence of excess air should be avoided.

Table II

	Kg. Cal. per mol	*Boiling point degrees C*
Hydrogen sulfide (H_2S)	122	—60
Methyl mercaptan (CH_4S)	299	6
Dimethyl sulfide (C_2H_6S)	456	37

Hydrogen sulfide is flammable in air between 4 and 46 per cent of total volume. The operation of the oxidizing boiler or equivalent would be more successful if the percentage of hydrogen sulfide could be about 46 per cent by volume as the quantity of excess air passing through the boiler would be reduced. Similar data on flammable limits for methyl mercaptan and methyl sulfide apparently have not been published.

The incondensible gases except from the recovery furnace should be collected in a gasometer or tank in order to avoid the presence of excess air. Such excess is objectionable in the efficient operation of any furnace.

The ducts for handling such gases should be outside of buildings. They should be of steel plate strong enough to resist possible explosion pressures. Explosion vents should be provided. Indicating devices are available for showing when explosive mixtures are developing for hydrogen sulfide and for automatically admitting air, or waste gases with carbon-dioxide content, to dilute the mixture as may be desirable. Grounding of ducts and equipment to prevent any static spark should be provided. Gases should be moved by natural draft or by fans with lead-coated blades.

Catalysts

Numerous catalysts are available for conversion of organic sulfur compounds for most of them have not passed beyond the laboratory stage. Hundreds of catalysts are available for the conversion of hydrogen sulfide.

At least one chemical company is prepared, however, to offer a catalyst through which the waste gases from the recovery furnace can be passed. Any organic sulfur compounds in those gases will be converted to SO_2 or elemental sulfur. Probably 60 per cent of the operating cost of such a catalyst arises from its deterioration. Reducing the loading in the waste gases from sulfur compounds and dust will reduce the operating cost of the catalyst. Such catalyst should be at least 90 per cent effective. If changes in plant equipment and operating methods have eliminated most of the odor or sulfur compounds from the waste gases, the subsequent use of the catalyst on the gases should assure almost complete elimination of odor.

The cost of the catalyst chambers is dependent upon the volume of waste gases handled. Efficient operation of the recovery furnace with a minimum of excess air therefore becomes important. Separation of such gases from those from the power boiler will also be necessary. The use of an Inka tower beyond the precipitator by cooling the gases will reduce further the size of the catalyst chambers.

Hydrogen sulfide by itself can be removed by the iron-oxide or dry-box method. The capital cost of such an installation for a mill producing 100 tons of Kraft pulp daily is prohibitive at about $350,000. In addition, there are substantial operating costs of about 20-25 cents per 1000 cu. ft. of gas purified, depending on the hydrogen-sulfide content.

Chimney Height

The waste gases from the recovery furnace could be passed up a higher chimney than is normally used in the paper industry. The smelter industry has gone with considerable success to chimneys 400-600 ft. high as compared with the usual 250 ft. in the paper industry. The higher chimney would give some dilution which could be increased by adding air to the waste gases about 50 ft. below the top. This air would be brought up the annular space between the inner and other walls. The use of a venturi throat and fan would increase the discharge velocity of the gases. The cross-sectional area of the chimney would be decreased by the cooling effect on the gases of the Inka tower.

Excessive humidity, rainfall, or fog would counteract, partly at least, the benefit from the use of a high chimney. Nearby hills higher than the top of the chimney would also be detrimental as causing winds to blow down on the chimney. The higher chimney, however, is a possibility, in some territories at least, whether a catalyst is or is not used. Such a chimney is said to have been used with considerable success on sulfur gases in the Ruhr, Germany, and in the United States.

Waste Effluents

Another source of odor is the waste effluents. These might average about 300 BOD, suspended solids about 100-150 p.p.m., at a pH of about 9.5. They are usually discharged directly into a stream or are first ponded for about 30 days in order to permit settling and acrobic action. Occasionally, they are treated with a chemical such as sodium nitrate in order to increase and quicken precipitation of solids.

These effluents can be brought under control by carbonating them with the waste gases from the lime kiln. These gases are high in CO_2, at about 22 per cent by volume, which will act to lower the pH, increase precipitation, and cause the giving off of the odorous gases from the waste effluents. Such gases should be collected in the closed carbonating chamber from which they can be piped to the power boiler, to the recovery furnace, to an oxidizing boiler where they can be burned, or to an oxidation tower.

About 1,000 lbs. of CO_2 daily will be needed for a waste effluent of 3,000,000 gals. daily from a mill of 100 tons of pulp daily if the total alkalinity is 300 p.p.m. and the pH is 9.8. The dust in the lime-kiln gas should be partially removed by a small separator and the gas then scrubbed and cooled as in carbonating any water supply.

If the lime kiln is not used as a source of CO_2, oil, gas, or coke can be burned to provide the small amount needed.

The sludge caused by the carbonating action could be separated in a "cyclator", or equivalent gravity-settling device with sludge-separating chamber, and pumped as slurry to lagoons. The supernatant liquid of about 2,900,000 gals. daily at about 150 BOD could be discharged to a stream or treated further on bio-filters. The "cyclator" or continuous clarifier should have a capacity for about four hours' flow.

The slurry of about 100,000 gals. daily withdrawn from the "cyclator" or clarifying unit should have a consistency of about 2 per cent for 3,000,000 gals. of waste effluent daily. This slurry if not lagooned could be pumped to digesters for anaerobic treatment. Each of four digesters required should have capacity for about 30-days detention. The sludge from the digesters should be essentially odorless. The supernatant liquid from them can be discharged to a stream or put through a small clarifier and over a small biofilter if its further treatment is essention.

The methane gas from the digesters can be burned. It should be about 35,000 cu. ft. daily at 650 BTU per cu ft. for 3,000,000 gals. daily of waste. This statement assumes 70 per cent volatile solids, average suspended solids of 125 p.p.m., and total probably solids of about 5800 lbs. per day in the slurry to the digesters. The digestion rate is assumed at 6 cu. ft. per lb. of volatile solids.

The preceding estimates on the handling of the waste effluents are approximate at best.

This discussion is not intended to be a final answer to the problem of elimination of odors and control of waste effluents from a Kraft paper mill. It is intended to show that there are several approaches to such a problem. The correct solution or combination of approaches will depend on local conditions and the extent of odor elimination and control of waste effluents desired by the community where the paper mill is located as well as the willingness of the management of the paper mill to meet those desires. The suggestions in this article should help paper-mill operators to find even better methods than outlined herein.

Enzymes in the Preparation of Tub Sizing

By

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Starch continues to find wide application in the surface sizing of various types of paper. It is a comparatively cheap source of adhesive material, and when suitably prepared provides a means for imparting certain desirable properties to the sheet. These properties are usually measured or evaluated by such well known tests as the Mullen, ink feathering, wax pick, etc.

Native or raw starch is seldom used, as such, for surface sizing of paper since it is common knowledge that it may be substantially improved by chemical or enzymatic treatments. The purpose of most of these treatments is to bring about a reduction in the viscosity of the starch while, at the same time, retaining its value as a sizing agent. This reduces the tendency of the starch solution to set back or thicken on cooling and improves the flow properties in general.

The application of enzymes in the conversion of starch is not new and like most developments has been improved steadily during the past few years as the experience of the industry has been brought to bear upon it. The high esteem in which the enzyme conversion process is held today stems from a number of considerations. Perhaps the most important of these is the flexibility which is afforded the mill operator in preparing sizings from different types of starch and in meeting a variety of requirements.

Of importance, also, are the characteristics of the enzyme used in the process. There are numerous enzymes which have the ability to act on starch. These differ somewhat in the way they bring about the hydrolysis of the starch. Some, for example, divide the molecule simultaneously into the comparatively small molecule of maltose and a much larger fraction of degraded starch. Others progressively reduce the size of the molecule in steps but without forming true sugars. The type of enzyme thus governs to a large extent the relative sizes of the component particles formed. Then too, enzymes differ in their preference as to pH and temperature operating characteristics. It is understandable, therefore, that to obtain the best results selection of the enzyme must be made not only in the light of its own characteristics, but with respect to those of the starch being treated and the sizing properties required. Today the type of enzyme known as Alpha Amylase is widely used because of its comparative inability to form fermentable sugars under the conditions which it ordinarily operates in the paper mill and because of its high resistance to heat. These properties assure a more homogeneous conversion of the starch since it is possible to convert safely at temperatures well above those at which starches such as corn and wheat start to swell or gelatinize. It should be mentioned that the so called gel point of starch is not a definite or fixed temperature like, for example, the melting point of a chemical compound. Swelling starts earlier and proceeds faster with some granules than others. This difference tends to become narrowed as the temperature is increased. If the conversion is carried out at the gel point it is apparent that the enzyme will act upon the more highly swollen granules first and will have little or no effect on the unswollen ones. By causing the enzyme to act at temperatures somewhat above the gel point, therefore, a more uniform action is to be expected.

The earliest enzyme preparations offered the industry were characterized by lack of uniformity and poor stability. In addition, they had not been correctly selected for the purpose. The industry was quick to appreciate the subsequent introduction of stable dry form preparations of standardized activity. As a means of reducing the bulk of material to be dispensed at the cooker, enzyme preparations of comparatively high potency have been recently introduced. Technological improvements in the production of enzymes have resulted also in a steady increase in starch converting power in relation to cost. The low cost of converting starch with enzyme is another reason for the continued expansion of its use by industry.

Selection of the kind of starch to use is largely determined by price and availability. The proportion of enzyme required with potato starch is usually somewhat lower than that required for corn. Potato starch ordinarily yields a more transparent size than corn starch and the dried film is slightly more lustrous.

The mechanics of converting starch as well as the numerous chemical factors which attend the reaction have also received considerable attention. The converting process is no longer a complicated one. It is possible to set it up in such a way that any person with ordinary intelligence will have no difficulty in handling the operation. The time consumed can also be adjusted to fit in with almost any production schedule.

In fact, recent introduction of a pre-measured enzyme capsule now makes it unnecessary even to weigh or measure the enzyme charge. These units are simply counted out in relation to the number of bags of starch required for the batch and then thrown into the cold slurry. The accurately measured enzyme charge is sealed within the unit and is consequently protected from the atmosphere during transportation and storage. Excellent stability or shelf life is thus assured. The shell is made of a warm-water soluble substance and the contents of the unit are not released into the slurry until some time after the heating has commenced. This delayed action is desirable in that the enzyme is further protected during the early stages of the process.

Starch manufacturers, too, have contributed to the progress of enzyme conversion by supplying the mills with starches of uniform pH values. With these pre-neutralized starches the step of adjusting pH at the cooker is seldom found necessary. Thus, the 1949 version of this interesting process consists of the simple steps of drawing water in the cooker and counting out the number of bags of starch and of enzyme units required. After slurrying for a few minutes, the steam is turned on and from there on the process can be entirely automatic, if suitable equipment is employed.

It is customary to convert starch for tub sizing to a specified range of viscosity and at certain concentrations of starch solids. Where the mill is required to size a number of different qualities, it may be found desirable to apply sizings of higher or lower solids. The conversion, consequently, is frequently carried out at the highest concentration likely to be required and the solution then reduced with water as needed to produce sizings of lower solids. While this procedure is convenient, it is apparent that the viscosity will necessarily change as the solution is diluted. In some instances, therefore, it may be found more satisfactory to change the extent of conversion so as to attain any desired viscosity at the size press regardless of the solids. By varying the degree of conversion in relation to solids, control over the absorption of size is attained. Slight conversion at low solids causes relatively more starch to stay at the surface and conversely more extensive conversion at high solids results in greater internal absorption. Enzyme converted starch

Presented at a recent meeting of the New England Section of TAPPI at Red Lion Inn, Stockbridge, Mass.

fin ls application on almost every quality of paper on which a starch type sizing would be considered satisfactory. It is estimated that the industry uses enzyme to convert upwards of 150 million pounds of starch annually.

The cooker or converting tank is preferably constructed of aluminum or stainless steel. Mechanical equipment for agitating is desirable although not always necessary. This will be governed by the size of the batch to some extent and by the concentration of the solids. Means for heating with live steam are usually provided. The steam inlets are so designed and positioned as to avoid bumping and local super heating. Use of a pump to draw the starch from the bottom of the tank and return it to the top during the conversion process is common practice and serves as an additional means for promoting uniformity.

Control of the heating cycle may be done manually, or automatically by utilizing a time temperature controller. Satisfactory results are also obtained by establishing the heating rate of the tank so that the temperature will rise at a steady rate of about 2½°F. per minute. This can be accomplished in almost any tank by making minor changes in the piping. With this type of installation it becomes unnecessary to time the batch or to watch temperatures. Conversion takes place as the temperature rises through the active range of the enzyme and is automatically arrested as it approaches the boil. If the steam pressure is relatively constant from day to day, consistent results will be obtained notwithstanding variations in water temperature which occur with the change in seasons.

The size after preparation is screened to remove extraneous matter. If circumstances require that the size be kept over a long period, it is good practice to add a small proportion of preservative as a protection against souring, especially in the hot weather.

In conclusion, I should like to mention a recent experience since it serves to illustrate the flexibility in the preparation of sizings which is afforded by the use of enzymes. A mill found it necessary to increase the wax of a certain sheet at the size press. They tried to accomplish this by increasing the concentration of the chlorinated starch which was normally used on this quality. This resulted in a serious decrease in the rate of drying. A batch of raw starch at twice the usual concentration was then enzyme converted and the viscosity brought to about the same value as that of the regular batch. The desired increase in the wax test was thus easily obtained and no adverse effects on the drying rate were observed.

Tub and Surface Sizing and Related Problems

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First let us clarify the difference between Tub and Surface sizing. Tub sizing is a method whereby the web of paper is immersed in the sizing solutions, wrapped around the bottom size roll which is running in the opposite direction to the rest of the Paper Machine, then passing to the second section of dryers or through an air dryer or being wound up for wet packing. The process is called surface sizing when the web of paper is passed straight through the size press, sizing solution being sprayed on the top side, while the bottom rubber roll carries sizing solution from the tub up to the nip where it is absorbed by the web.

The basic reason for this difference is speed of machine. When paper machines began to operate at speeds in excess of 250 feet per minute, it became quite difficult for the machine crews to carry the web around the immersed bottom roll whereas threading straight through the press was not only easier but caused fewer fingers to be caught in the nip of the size press.

Everything else being equal, the main difference between the two methods is that at the same speed, surface sizing will pick up about 25% less sizing solution for the obvious reason that the time of contact is shorter. To counteract this it was necessary to increase the temperature and the solids content of the sizing solution. Reducing beater sizing to pick up more solution would produce similar results except that it is better to control the viscosity of the sizing solution than to try to adjust internal sizing, because of the many variables effecting this characteristic.

The choice of material to use for tub or surface sizing will depend on the end use, and in this area, it ranges between 100% Hide Glue or 100% Bone Glue to 100% starch gum with the concentrations dependent on the results desired.

In making 100% cotton content bond paper to have a good cockle, I would prefer having a slight feather before the tub to insure absorption of sufficient glue to insure good cockle. On the other hand when making a sulphite sheet for offset printing I prefer harder internal sizing to keep the gum sizing on the surface to produce a good pick test, and to give a better gloss when printing with spirit varnish.

While tub or surface sizing will sometimes cover up a multitude of sins, it is possible to encounter conditions where the sizing value becomes less after passing through the sizing solution. On one occasion, using 40° Be Glue, Solution, the trouble was corrected only by replacing what we were using with a fresh batch of glue. Apparently an excessively high temperature (140° F) for too long a period caused the glue to be converted to amino acids.

When converting starch to gum by the use of enzymes a similar problem may result from failure to stop the reaction at the proper time, thus degrading part of the gum to sugar.

Regarding the size press there are many ideas as to the proper plastometer reading and crown of the rubber roll. Of course the amount of crown necessary for any roll is that required to offset deflection. This is dependent on the length and diameter of the roll as well as the amount of weighting to be used.

Regarding Plastometer readings, I was brought up in the paper business to use rolls with the highest plasticity for the wettest paper and lowest readings or hardest roll, with the driest paper.

One machine which I operated had, on the first press, a 36 plastometer roll with 100″ face, 16″ diameter, .020″ crown and carried 50 pounds on each lever. The second press rolls were the same size except the crown was .035″ and plastometer reading was 20. Two 50 pound weights were carried on each lever. The size press had a plastometer of 10 and .008—.01″ crown, same size roll with 15 or 20 pound weight on each lever. This arrangement worked very well until one time when the size press spare rubber roll was away being fitted with roller bearings and it became necessary to use the spare first press roll having a plastometer of 36. There was no apparent difference in the results obtained with this softer roll.

We were always afraid of soft rolls for a size press, because of the possibility of corrugations of wash boarding, however, it is my understanding that size press rolls are now being used with plastometers of 30 and crowns from .020″ to .030″ depending on face and diameter of roll. Although there hasn't been any apparent difference in soak or pick-up, the finished paper is much flatter.

Moisture tests taken front, middle and back, as the web leaves the size press, will verify proper crown. It is also possible to use carbon paper against white paper to give a picture of the nip width that shows at a glance if crown is correct and can also be measured to determine pressure in pounds per square inch.

Presented at a recent meeting of the New England Section of TAPPI at Red Lion Inn, Stockbridge, Massachusetts.

Semichemical Pulping[1]

By

G. H. CHIDESTER

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Abstract

A mild chemical treatment of wood chips followed by mechanical refining to complete the fiber separation produces semichemical pulps high in yield and strength. The procedure is adaptable to a wide variety of wood species and wood wastes. The pulp strengths obtained are particularly high for hardwoods.

The influence of the chemical treatment with acid, neutral, and alkaline liquors and bleaching on the yield and properties of semichemical pulp are discussed.

The well-established use of semichemical pulp in the manufacture of corrugating board and other products and the indication in experimental trials of the suitability of semichemical pulps for many other kinds of paper are described.

The high yield of pulp obtained by the semichemical processes and their adaptability to many wood species not now used extensively should serve as incentives for even more extensive commercial applications.

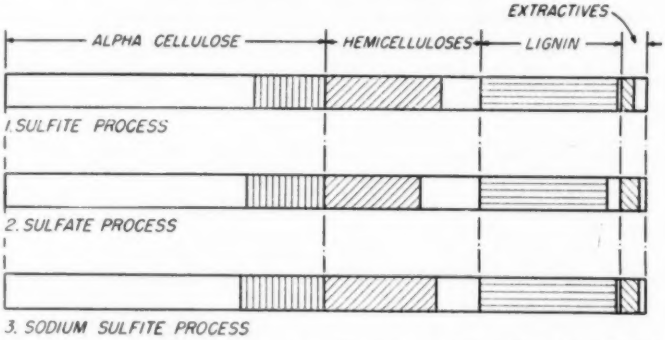
About 90 percent of the fibrous raw material currently used in the United States for making paper comes from wood. The availability and low cost of wood fiber have made possible a very great expansion in the production and consumption of paper since the early days when the industry depended upon other sources of fiber. Yet even today the efficiency of the recovery of fiber from wood cannot be considered to be high, since about half of the wood is lost in the manufacture of chemical pulp.

It is true, of course, that the mechanical process used in groundwood pulping gives a high pulp recovery from the wood used. Wood pulp was first made by this process, and groundwood pulp is still used in large quantities. The uses that can be made of groundwood pulp, however, are limited by its low strength and low brightness. It was not possible to make the wide variety of strong and white papers from wood pulp until the chemical pulping processes, soda, sulfite, and sulfate, were developed.

It was not until the later development of semichemical pulping at the Forest Products Laboratory *(1)*, however, that any important compromise was feasible between groundwood pulps on the one hand and the low-yield chemical pulps essentially free of lignin on the other. The properties attainable in semichemical pulp have shown that it is not always necessary to destroy so much wood as previously in the manufacture of pulps having the physical properties necessary for strong papers. Pulps with good felting properties and capable of producing other sheet properties necessary for many uses can be obtained without complete delignification.

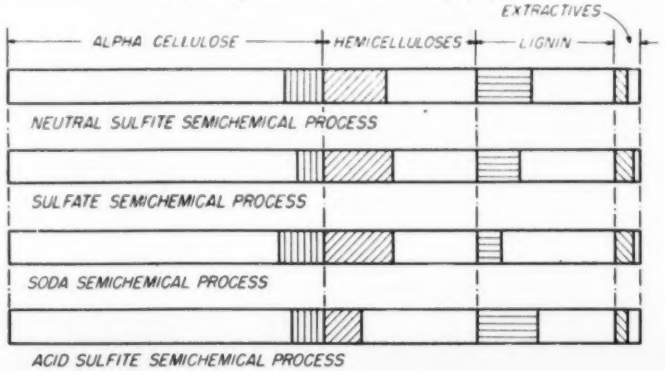
Semichemical pulping consists of a mild chemical treatment to remove a part of the lignocellulose fiber-bonding material, followed by mechanical refining to complete the fiber separation. Such a procedure can produce pulps varying in yield from a figure above 90 percent for groundwood to the 50 percent or less obtained in chemical pulping. The yield obtained depends upon the severity of the chemical treatment. Generally, the pulp strength increases quite rapidly as the yield is lowered. Pulps produced from some woods under suitable conditions in yields between 70 and 80 percent have strengths approaching those developed in some fully cooked chemical pulps. In the yield range of about 70 percent to perhaps 85 percent, is found the desirable combinations of a high yield, together with comparatively high strength. Rue and his associates used a neutral sodium sulfite liquor to obtain a high pulp strength and a light color in this relatively high-yield range.

Neutral sulfite semichemical pulp is prepared by heating wood chips in the sodium sulfite liquor at temperatures up to 170°C. for 1 to 3 hours. The cooking liquor contains the amount of sodium sulfite necessary to remove the desired amount of wood substance. About one part of sodium carbonate to four parts of sodium sulfite is usually added to maintain a pH neutral enough to prevent excessive corrosion and possible pulp degradation. This treatment removes, principally, up to about half the lignin in the wood and some of the hemicellulose material. The chips



Above: Figure 1. Removal of hardwood constituents in chemical pulping. Cross-Hatched Portions Represent Material Removed in chemical pulping.

Below: Figure 2. Removal of hardwood constitutents in semi-chemical pulping. Cross-Hatched Portions Represent Material Removed in pulping.



[1] Presented at the 1949 Annual Meeting of the Forest Products Research Society, Grand Rapids, Mich.

[2] Maintained at Madison, Wis., in cooperation with the University of Wisconsin.

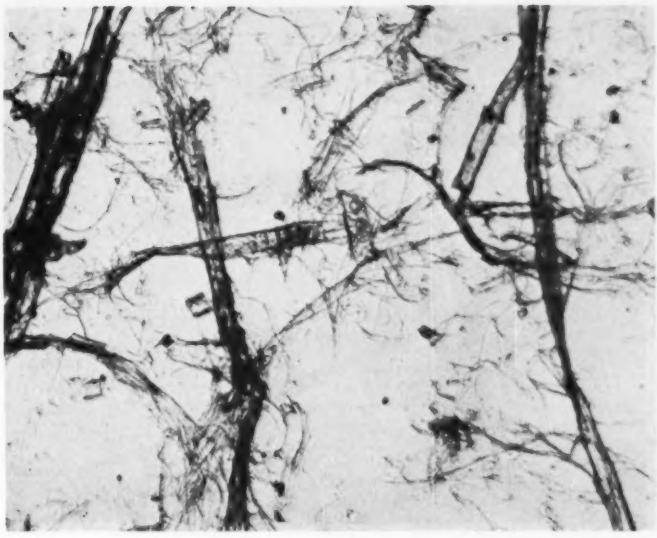


Figure 3. Spruce groundwood pulp highly magnified, showing large amount of fines.

are softened so that the fibers can be separated very readily in the mechanical refining.

Somewhat similar results, except for a darker color, can be obtained with conventional sulfate cooking liquor adjusted to the proper concentration of sodium hydroxide and sodium sulfide. One of the advantages of this procedure is that the chemicals in the spent liquor are recoverable by conventional methods. Ordinary acid sulfite liquor can likewise be used. The pulps obtained with this liquor, as with sodium sulfite, are light-colored, but their strength is lower.

Wood Constituents Removed During Pulping

The principal constituents dissolved from the wood during chemical and semichemical pulping of hardwoods are shown in *Figures 1* and *2*. The values represented may be considered as fairly typical, but are not constant quantities obtained in all instances, since they vary with the cooking conditions and the wood species. The chemical pulps, acid sulfite, sulfate, and sodium sulfite, indicated in *Figure 1*, were all produced in yields slightly below 50 percent. Except for small residual amounts of lignin remaining in these pulps, which were slightly higher for the sulfate pulp, all the lignin in the wood was removed. Considerable quantities of the hemicellulose constituents were also dissolved, and an appreciable quantity of the alpha cellulose was destroyed. The acid sulfite process removes more of the hemicelluloses and destroys a little less of the alpha cellulose than the alkaline process.

The wood constituents removed in semichemical pulping for each of the conventional-type liquors are shown in *Figure 2*. The values in all instances correspond to a pulp yield of 75 percent. At this yield the acid sulfite liquor is shown to have removed more of the lignin and, in contrast to the fully delignified pulps, less of the hemicelluloses than the alkaline or neutral liquors. Also, slightly less of the alpha cellulose was removed. The neutral sodium sulfite liquor also removed a little more of the lignin than did the alkaline liquors. The soda liquor, on the other hand, is shown to have removed less lignin and more cellulose than the others.

Fiber Characteristics

In the preparation of pulp for high-quality papers a complete separation of the fibers is essential. Also, the fibers should be capable of developing a satisfactory fiber-to-fiber bond when the sheet is formed and dried. An indication of the degree to which these requirements are met in semichemical pulp compared with groundwood and sulfite pulps, is illustrated in *Figures 3*, *4*, and *5*.

Figure 3 is a photomicrograph of groundwood pulp showing a fiber bundle and parts of broken or disintegrated fibers. The average fiber length is considerably less than that of the unbroken wood fibers. The sheet strength is low because of the short fiber length and the high lignin content.

Figure 4 shows well-separated sulfite-pulp fibers, which upon beating are capable of developing fibrillation and good surface bond strength in the delignified cellulose fibers.

Figure 5 shows the semichemical pulp fibers also to be well separated without excessive disintegration. As a result of the mechanical refining, some fibrillation indicative of the capability of producing good bond strength is evident. Presumably, enough of the lignin encrustant has been removed to allow cellulose bonds between fibers to become effective.

Physical Properties of Semichemical Pulps

Strength values of neutral sulfite semichemical pulps corresponding to yields between 70 and 81 percent are given for 29 hardwoods and 10 softwoods in *Table 1*. Of the hardwoods, birch, aspen, cottonwood, and sugar-

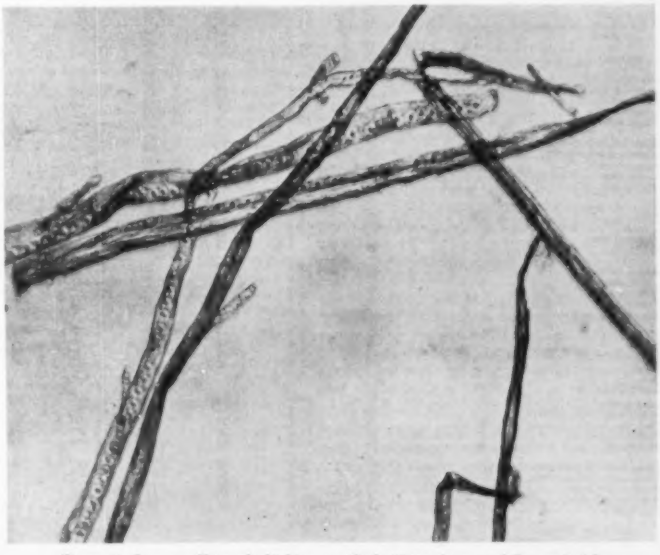


Figure 4. Spruce sulfite pulp highly magnified. Note absence of fine material.

berry developed bursting strengths between 0.80 and more than 0.90 point per pound per ream. In the lowest bursting-strength range, from 0.20 to 0.40 point per pound per ream, are the oaks, bitter pecan, and white ash. The pulps in the highest bursting-strength range are about 75 to 80 percent of the corresponding values for spruce sulfite. The tearing strengths, however, are lower. The strengths of the hardwood semichemical pulps are appreciably higher than those of the sulfite pulps made from the same wood and approach the corresponding values for sulfate pulp from the same wood. For a given yield the lignin content of the pulp varies with the amount of lignin in the wood. A high residual lignin content in a pulp may account in part for its relatively low strengths in some instances.

In general, the strengths of the softwood semichemical pulps are higher than those of the hardwood pulps, but in contrast to hardwoods the softwood semichemical pulps have lower strengths than the more completely delignified chemical pulps. For some softwoods, the stregths of the semichemical pulps approach those of sulfite pulps made from the same species, but they are considerably lower than those of their sulfate pulp.

The color of unbleached neutral sulfite semichemical pulps varies with the color of the wood. Light-colored woods produce pulps only slightly darker than unbleached sulfite pulp. The neutral sulfite semichemical pulps of lighter color can be substituted for unbleached sulfite to a certain extent in some products if their strengths are sufficient.

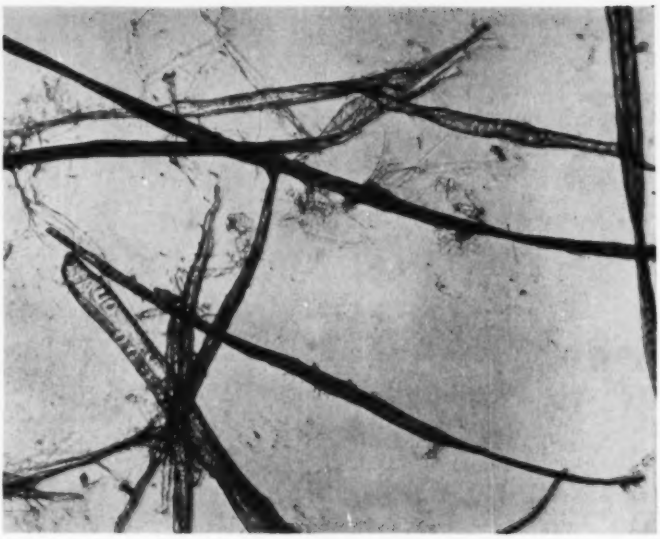


Figure 5. Neutral sulfite semichemical pulp highly magnified—50 percent jack pine and 50 percent aspen.

Semichemical pulps tend to produce hard, brittle sheets having low opacity. Although these properties can be controlled to some extent in refining, for many uses it is desirable to blend them with other pulps to compensate for these characteristics. In refining the pulps it is necessary to accomplish the separation of the fibers to the degree required for their subsequent use. The reduction of shives is particularly important for high-quality papers and for bleaching. It is unfortunate that in refining the freeness, or drainage rate, and the tearing strength are usually reduced more than is desirable in accomplishing the necessary fiber separation. In order to accomplish fiber separation with the least reduction in tearing strength, cutting effects in refining should be avoided as much as possible. In ideal refining treatment would be one capable of producing fiber separation with as little hydration as possible and of providing a means of controlling hydration to the extent required. Considerable improvement has been made in refining semichemical pulps, and many of the uses of semichemical pulps, both in mill production and experimental trials, mentioned later, would not have been possible with the excessively hydrated and lower-strength pulps originally obtained. More recent improvements in refining methods give some promise of attaining more of these effects.

Table I
Strength Properties of Neutral Sulfite Semichemical Pulps.

Species	Pulp yield	Na_2SO_3 consumed	Pulp strength at 550 cc. S.R.[1] Burst[2]	Tear[2]	Double folds	Pulp lignin content
	Lb. per 100 lb. O.D. wood	Lb. per 100 lb. O.D. wood	Pts. per lb.	Gm. per lb.	No.	Percent
HARDWOODS:						
Paper birch	79	10.2	0.93	0.95	315	13.4
Yellow birch	81	11.7	.87	1.17	131	15.2
Quaking aspen	77	11.8	.93	.86	161	11.6
Black tupelo	80	8.0	.64	1.00	29	18.2
Sweetgum	76	9.1	.62	.88	100	14.3
Blackjack oak	78	12.6	.32	.68	...	...
Overcup oak	74	8.3	.29	.57	2	23.7
Post oak	76	6.4	.24	.53	1	18.9
Chestnut oak	73	9.1	.36	.76	9	14.0
Black willow	79	11.9	.79	1.00	100	14.9
Southern cottonwood	79	12.0	.82	.88	150	14.6
Eastern cottonwood	76	13.3	.84	.79	30	15.1
Sugarberry	75	10.2	.80	.96	135	18.0
Green ash	74	9.2	.43	.70	10	21.8
White ash	77	8.0	.30	.67	11	22.4
American elm	81	9.5	.53	.73	6	20.9
Bitter pecan	80	8.1	.35	.80	5	21.7
Hickory	78	10.6	.50	.74	35	16.0
Sugar maple	80	11.0	.64	.74	30	15.3
Soft maple	76	14.1	.74	.95	95	13.3
American beech	77	9.4	.56	.78	29	14.1
Black cherry	72	11.8	.74	.90	50	12.2
Yellow-poplar	76	11.4	.67	.91	25	11.3
Red alder	80	11.0	.48	[3]1.34	7	...
Eucalyptus (*gigantea*)	75	9.0	.46	1.17	...	...
Nitre	79	11.5	.46	.63	17	16.4
Ulmo	71	15.6	.43	.78	8	11.0
Coigue	74	12.6	.45	.71	46	13.5
Tepa	81	12.3	.52	.80	52	23.8
SOFTWOODS:						
Jack pine	78	19.0	1.08	.93	405	16.0
White pine	81	15.7	.84	.80	380	22.9
Red pine	79	17.5	.85	.70	400	19.6
Shortleaf pine	78	18.0	.58	1.00	60	20.3
Tamarack	77	17.2	.81	1.20	160	19.0
Douglas-fir (second growth)	80	19.3	.82	1.06	155	18.9
Douglas-fir (old growth)	77	17.4	.64	.95	130	20.1
Western hemlock	85	15.3	.92	1.40	150	...
Western redcedar	73	19.8	1.05	.90	500	...
Black spruce	81	21.3	1.07	.80	...	18.7

[1]Schopper–Riegler.
[2]Ream size—25 x 40–500.
[3]680 cc. freeness.

Influence of Yield on Pulp Strength

As mentioned earlier, the yield of pulp decreases and the strength of the pulp improves as the lignin removal progresses with digestion. *Figure 6* shows the variation in bursting and tearing strengths with yield of neutral sulfite semichemical pulp for four species.

It is indicated that the strengths in

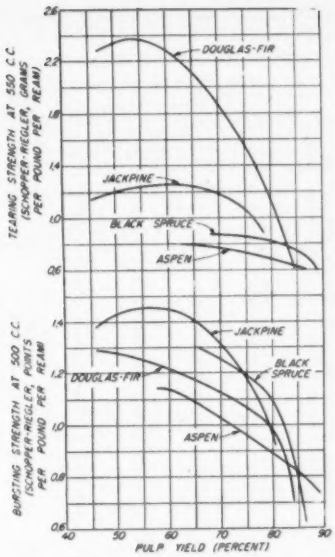


Figure 6. Relation of bursting and tearing strengths to yield of neutral sulfite semichemical pulp.

most instances would reach maximum values at yields between 50 and 60 percent and that they would decrease rapidly at yields greater than 80 percent. Yields greater than 90 percent would probably show bursting-strength values in the low range of 0.10 to 0.20 point per pound per ream, which is below the strength of some groundwood pulps.

Pulp Strengths Resulting From Different Cooking Liquors

In general, the strength of semichemical pulps prepared with acid, neutral, or alkaline cooking liquors have relationships similar to those for the fully delignified pulps prepared with these liquors. The neutral sulfite and the sulfate semichemical pulps have higher strengths than soda or acid sulfite semichemical pulps. With some exceptions the strengths at the higher yields are somewhat higher for the neutral sulfite semichemical pulps than those for the sulfate pulps.

Figure 7 gives a comparison of the strengths of these two kinds of semichemical pulps prepared in different yields from jack pine. Although the tearing strength is slightly higher for the sulfate semichemical pulp over the entire yield range, the other strength properties are higher for the neutral sulfite pulp than the sulfate at yields above 65 percent. (2)

Bleaching

Neutral sulfite semichemical pulps from some woods can be bleached to brightness values up to about 75 percent, which is below a high white, in single-stage treatments with either sodium peroxide (3) or hypochlorite. (4) In spite of the high lignin content of the pulp, the reduction in yield on bleaching is small for either procedure, since little lignin is removed under these conditions. A slight improvement in pulp strength results from single-stage bleaching.

Neutral sulfite semichemical pulps can be bleached to brightness values of 80 percent or more, which is within the range of a high white color. (4) This usually requires a multistage treatment with chlorine, caustic soda, and hypochlorite. In such a treatment all of the lignin and some of the cellulose and hemicellulose are removed. Since the lignin content of the unbleached pulp is high, considerably more chlorine (10 to 20 percent of the pulp) is required than is necessary for bleaching chemical pulps. The yield of bleached pulp is 55 to 60 percent of the wood. The removal of lignin in this combination of cooking and bleaching is much more selective than it is in the preparation of bleached chemical pulps with yields below 50 percent, so that the yield of cellulose in the completely delignified semichemical pulp is considerably higher.

It is perhaps equally significant that this delignification and bleaching procedure results in a great improvement in pulp strength. For hardwoods the strength is generally higher than that of pulps prepared by other processes, and for some of them it is equivalent to that of strong softwood sulfites. Because they develop hydration rapidly, they are particularly suitable for glassine paper, but are less suitable for most other papers when used alone. The strengths of pulps made from several hardwoods bleached in this way are given in *Table II*.

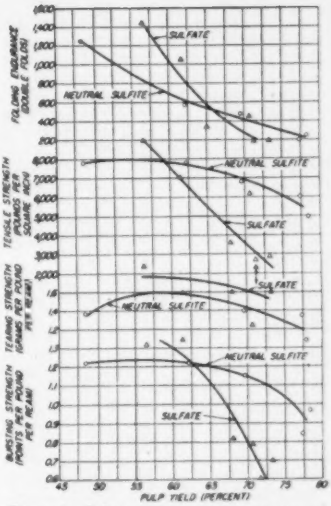


Figure 7. Relation of strength properties of jack pine natural sulfite and sulfate semichemical pulps to yield of pulp.

Sulfate semichemical pulps can be bleached in a similar manner, but they require much more chlorine than the neutral sulfite semichemical pulps because of their higher lignin content. Acid sulfite semichemical pulps can also be bleached in the same way, but the resulting strengths are lower than the other kinds of semichemical pulps.

Uses of Semichemical Pulp

Unbleached Pulps

Neutral sulfite semichemical pulp was first used commercially for the manufacture of 9-point corrugating board from tannin-extracted chestnut chips. This use has been well-established for many years, and the production of high-quality corrugating board from semichemical pulp from other woods has expanded to approximately half a million tons annually. One of the principal requirements in corrugating board is stiffness in the corrugated sheet. The strength required, however, is comparatively low. A light color is not essential, and shives and specks are not objectionable. The necessary properties can be obtained from most woods. *Table III* lists the properties of experimental corrugating boards made from a number of species and wood wastes.

Semichemical pulp is also used in making some grades of wrapping paper, insulating board, roofing felt, and a few other products.

Experimental linerboards of excellent quality and considerably lighter in color than kraft liners have been made from jack pine semichemical pulp and from mixtures of jack pine and aspen

Table II
Strength Properties of Neutral Sulfite Semichemical Pulps.

Species	Yield of bleached pulp	Bleached pulp brightness	Pulp strength at 550 cc. (S.–R.)[1]		
			Burst[2]	Tear[2]	Double folds
	Lb. per 100 lb. O.D. wood	Percent	Pts. per lb.	Gm. per lb.	No.
Quaking aspen	60	77	1.20	1.02	500
Paper birch	57	83	1.18	.90	850
Soft maple	62	66	.93	1.15	280
American beech	59	77	.79	1.13	146
Black tupelo	55	82	1.09	1.35	560
Yellow-poplar	56	82	1.20	1.10	500
Sweetgum	57	81	1.08	1.40	550
Beech, cherry, maple	56	83	.93	.91	220
Eucalyptus	52	85	.86	1.55	300
Douglas-fir	42	84	1.18	2.60	1,000

[1]Schopper-Riegler.
[2]Ream size—25 x 40-500.

semichemical pulps obtained in yields of 75 to 80 percent. (2) The strength requirements for linerboard are considerably higher than those for corrugating board. The digestion and refining of the pulps have to be carefully controlled so that high strengths are attained at a high freeness. Linerboards of good quality have also been made experimentally at the Forest Products Laboratory from several other species. The physical properties of these linerboards are given in *Table III*.

Experimental newsprint papers of good quality have been made by using substantial amounts of hardwood semichemical pulp as a part of the furnish. The comparatively high strength of the hardwood semichemical pulp permits the inclusion of an appreciable proportion of low-strength hardwood groundwood. Good-quality experimental newsprint containing as much as 80 percent birch has been made from a combination of 50 percent birch semichemical pulp, 30 percent birch groundwood, and 20 percent spruce groundwood. Unbleached semichemical pulps of light color can be used to advantage as a partial substitute for unbleached sulfite pulp when it is used in combination with groundwood pulp for other papers and paperboards.

Semichemical pulps from wood waste. — Experimental semichemical pulps have been made from material ordinarily left in the woods after logging and from various forms of mill waste, which may include appreciable quantities of bark and fines. Bark and fines produce dirt and low pulp strength. As much as 20 or 25 percent of such material might be used with wood chips for corrugating board, however, if the species is suitable. Coarse pulps for wallboard, roofing felt, and some other products have even lower strength requirements, and they can easily be met in semichemical pulps made from various forms of waste.

Decayed wood can also be used for making semichemical pulp for uses in which the pulp strength is adequate and the darker color and dirt content are not objectionable. It is indicated that for some kinds of decay, white pocket, for example, there may be little or no loss of pulp strength because of the decay, even though the decay may have progressed far enough to reduce appreciably the specific gravity of the wood.

Table III

Properties of Semichemical Corrugating and Liner Boards.

Species	Semichemical process	Pulp yield	Properties of paperboards[1]					
			Weight	Caliper	Bursting strength		Tearing strength	Compression resistance
					Mullen	Unit		
		Lb. per 100 lb. O.D. wood	Lb. per 1,000 sq. ft.	0.001 inch	Pts.	Pts. per lb.	Gm. per lb.	Lb.
CORRUGATING BOARDS:								
Hardwood Pulpwood								
Aspen	Neutral sulfite	78.0	32.6	8.1	101	0.88	0.99	24.2
Do[2]	Sulfate	74.7	26.3	8.9	50	.55	1.01	11.6
Southern cottonwood	Neutral sulfite	79.2	28.7	8.5	50	.50	1.04	----
Do	Sulfate	74.7	39.4	9.0	89	.64	.95	----
Do	Acid sulfite	72.7	36.9	8.5	42	.33	.65	----
Black willow	Neutral sulfite	79.1	40.7	8.6	92	.65	1.04	----
Do	Sulfate	77.5	42.0	9.5	86	.59	1.14	----
Do	Acid sulfite	74.7	32.3	8.8	38	.34	.59	----
Sugarberry	Neutral sulfite	75.0	31.5	8.9	52	.47	1.12	----
Elm	Sulfate	74.3	28.1	8.4	44	.44	.89	----
Hickory	Neutral sulfite	78.7	27.3	9.4	45	.47	1.24	13.7
Do	Sulfate	75.9	26.5	8.9	30	.33	1.18	13.8
American elm	Neutral sulfite	81.4	29.7	9.3	38	.36	.81	----
Do	Sulfate	75.0	33.8	9.4	44	.38	1.13	----
Bitter pecan	Neutral sulfite	80.0	30.5	7.9	28	.29	.67	----
Do	Sulfate	78.5	35.4	10.0	53	.48	.92	----
Green ash	Neutral sulfite	74.4	28.2	9.5	14	.15	.52	----
Do	Sulfate	75.3	32.0	9.9	35	.31	.66	----
Sweetgum	Neutral sulfite	79.2	30.2	9.7	51	.49	1.15	----
Chestnut oak	do	74.8	25.9	9.6	30	.34	.99	12.0
Do	Sulfate	78.5	26.4	9.3	33	.35	.82	12.5
Overcup oak	Neutral sulfite	75.4	29.3	10.2	30	.29	.52	14.2
Do	Sulfate	68.9	29.9	10.0	36	.35	1.00	12.6
Post oak	Neutral sulfite	76.2	24.1	9.4	17	.21	.69	7.0
Do	Sulfate	69.5	26.1	9.2	28	.27	.70	----
Blackjack oak	Neutral sulfite	71.1	35.9	9.0	58	.47	.87	----
Do	Sulfate	75.7	27.5	9.5	31	.32	.70	----
Hardwood Wastes								
Woodworking wastes[3]	Neutral sulfite	76.4	29.8	9.3	30	.29	.75	9.8
Do	Soda ash	76.7	28.0	9.6	28	.29	.77	10.8
Cull hardwoods[4]	Neutral sulfite	77.9	26.0	9.3	29	.33	.77	9.9
Extracted oak[5]	do	72.5	31.2	9.4	38	.35	.72	16.7
Softwood Pulpwood and Wastes								
Young-growth Douglas-fir	Neutral sulfite	84.1	26.5	10.4	50	.56	2.75	10.3
Decayed,[6] old-growth Douglas-fir	do	75.4	25.0	8.9	49	.56	1.97	11.1
Do	Sulfate	74.3	26.8	9.4	29	.31	2.23	9.0
Douglas-fir hogged waste	Neutral sulfite	81.5	25.6	11.1	49	.55	2.37	11.9
Western redcedar	do	72.7	25.9	9.1	37	.37	1.37	14.2
Western hemlock	do	84.7	29.6	11.9	71	.69	2.11	14.8
Commercial Southern Hardwood Semichemical	Neutral sulfite	----	26.6	9.8	32	.34	1.33	12.9
LINER BOARDS:								
Hardwood Pulpwood								
Aspen	Neutral sulfite	78.2	57.3	14.7	121	.64	1.33	48.2
Paper birch	do	78.6	54.4	15.3	134	.71	1.28	45.7
Eastern hardwoods[7]	do	72.0	52.3	15.1	102	.57	1.16	34.9
Eucalyptus (*gigantea*)	do	70.7	46.4	14.8	111	.69	1.28	37.9
Softwood Pulpwood								
Jack pine	Neutral sulfite	78.0	48.0	15.5	127	.75	2.12	28.8
Do	Sulfate	73.3	43.4	15.4	87	.58	2.61	19.8
Red pine	Neutral sulfite	79.0	50.4	23.4	100	.57	1.50	22.4
White pine	do	81.3	50.6	20.1	107	.61	1.55	28.8
Tamarack	do	77.0	53.6	17.2	134	.72	1.78	37.5
Western redcedar	do	65.0	46.1	14.4	131	.82	1.57	39.1
Western hemlock	do	84.7	47.5	16.9	130	.79	2.30	35.0
Second-growth Douglas-fir	do	80.3	48.2	16.0	100	.59	2.92	26.1
Sound, old-growth Douglas-fir	do	76.6	48.3	19.3	91	.54	2.65	26.7
Do	Sulfate	63.9	47.8	15.6	64	.39	3.16	24.1
Commercial Southern Pine Sulfate	Sulfate[8]	48	42.9	14.5	110	.73	3.26	27.2

1. Ream size—25 x 40—500.
2. Rough wood used.
3. Mixture of hogged box, furniture, and veneer mill wastes.
4. Mixture of sugar maple, red maple, yellow birch, and beech.
5. Predominantly red oaks, chestnut oak excluded
6. Firm-rotted wood used.
7. Mixture of beech, cherry, and maple.
8. Not semichemical.

Bleached Pulps

In experimental trials bleached aspen semichemical pulps have been successfully substituted for bleached softwood sulfite pulp used in combination with aspen groundwood pulp in making paper for machine coating. (5) Satisfactory bulk and opacity were maintained by the groundwood pulp. The relatively high strength of the bleached semichemical pulp was used to advantage in other trials to maintain the sheet strength when a low-strength, free aspen groundwood produced at a low energy consumption was used. (6) Substantial quantities of bleached aspen semichemical pulp are now being used in the manufacture of groundwood book papers that are machine coated for which they replace a part of the softwood sulfite pulp component.

In small-scale paper-machine trials, bleached semichemical pulps from aspen and other hardwoods have been substituted for bleached softwood sulfite pulp in combination with soda pulp in high-quality, carbonate-filled, groundwood-free book papers with good results.

In mill-scale trials (7) bleached aspen semichemical pulp has been used very successfully in making the high-quality glassine paper ordinarily made from Mitscherlich sulfite pulp.

Other trials have indicated that bleached hardwood semichemical pulp can be used advantageously with groundwood pulp in towel papers when employed in amounts up to 35 percent to replace softwood sulfite pulp.

Bond papers having good formation and surface characteristics and satisfactory strength have been made experimentally by using up to 50 percent bleached aspen semichemical pulp to replace bleached softwood sulfite pulp.

General

It is thus apparent that considerable progress is being made in the manufacture and use of both unbleached and bleached semichemical pulp for various commercial papers and boards. Successful experimental trials have

indicated their suitability for many other uses. The high yield of pulp obtained by the semichemical processes and the adaptability of these processes to the many wood species that are available but not used extensively today, should serve as incentives for investigations to apply the processes to other woods and to find additional uses.

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Engineered Instrumentation for Chemipulp Process

Produces Increased Yield, Savings in Steam, Sulfur

By

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The Chemipulp Hot Acid Cooking and Recovery System is an improved method of preconditioning and cooking fibrous material in a pressure vessel by the use of preheated cooking acid, and of recovering both heat and SO_2 gas from the digester relief. Since the digester is charged initially with hot acid (at about 176°F.), the actual cook starts at what would be the second hour of the conventional cold acid cook. The net result is a reduction of about 2,000 pounds of steam per ton and a saving of about two hours in cooking time. This steam saving is enough to cook an additional third of a ton of pulp.

The amount of sulfur saved varies with the individual installation. An average of seven mills formerly using cold acid showed a saving of about 50 pounds of sulfur per ton of pulp after installing the hot acid system.

An increase in yield is also obtained. Average increase in yield of five mills that changed to this system proved to be 114 pounds of pulp produced; i.e. the same amount of wood that produced one ton of pulp when the cold acid method was used, produced 2,114 pounds of pulp after installation of the hot acid cooking and recovery system.

Normally, the Chemipulp Hot Acid Cooking and Recovery System is able, by the direct savings just listed, to pay for the complete cost of the installation in from 15 to 30 months. This variation in time is attributable to local conditions affecting cost of installation and to actual operating procedure in the individual mills.

Operation of Chemipulp System

The digester is filled with chips in the usual manner and the top cover is bolted on. Hot acid from the high pressure accumulator (discussed in detail later in the article) is next pumped into the digester through the blow-off fitting. During pumping, the digester is vented at the top through the digester vent header. Although the air is vented to atmosphere outside the digester building, a small one-quarter inch discharge opening inside the operating room makes it easy to detect the appearance of SO_2 gas. When this gas appears (a sign that all air has been vented, the vent to atmosphere is closed and the gas passed directly to the constant level recovery tank.

When the digester has been completely filled with acid, the vent valve at the digester is closed and a hydrostatic pressure of from 15 to 90 psi is developed. The top and side relief valves are then opened and the acid is precirculated through the digester, high pressure header, high pressure eductor and accumulator. This circulation of hot acid removes inert gases and a high percentage of water solubles, preconditions the chips to a more uniform moisture condition, produces a high, uniform temperature throughout the digester, and saturates each individual chip with sufficiently hot strong acid to cook it evenly from the inside to the outside. The precirculating time in different mills varies with local conditions and is determined after a study has been made of factors such as: size of digesters, kinds of wood, moisture conditions, and quality of pulp desired.

Upon the completion of the precirculation period, the pump is stopped and the hydrostatic and gas pressures within the digester force acid out through the top and side relief lines and the high pressure line into the accumulator, or through the low pressure line into the recovery tank, thus lowering the liquor level in the digester preparatory to steaming.

Steam is now admitted through the hydroheater and the cooking cycle progresses. Steam condensate, and

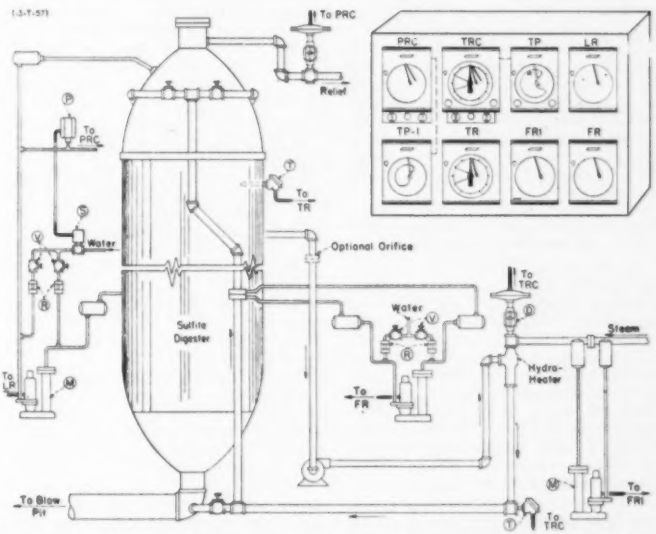

Figure 1. Instrumentation for control of Chemipulp KC direct cook digester. Legend: PRC—Pressure controller with *Indexet*; TRC—*Electronik* recording temperature controller with indexet; FRI—Recording and integerating flow meter; TP—*Time-pattern* transmitter; TR—*Electronik* temperature recorded; LR—Liquid level recorder; FR—Flow recorder; D—Diaphragm motor valve; M—Electric flow meter body; P—*Pressuretrol*; S—Solenoid valve; T—Thermocouple; R—Rotameter; V—Regulating valve.

consequently acid dilution, are held to a minimum because of the high initial temperature in the digester and the almost perfect penetration of acid into the chips during the precirculating period.

During the initial phase of the cooking period, digester relief passes through the high pressure eductor to the high pressure accumulator where it heats and fortifies acid being pumped from the low pressure accumulator. Toward the end of the cook, when pressure is reduced preparatory to blowing, the relief passes through the low pressure eductor to the low pressure accumulator.

The high and low pressure eductors, or injectors as they are sometimes called, are devices for reducing the back pressure on the relief header and mixing and absorbing the relief liquor and gases with a flowing stream of acid before entering the proper accumulator. Mixing and absorbing are accomplished by forcing continuous streams of cold acid through nozzles in the drop legs of the high and low pressure relief lines leading to the accumulators. The high velocity jet developed creates a suction pull which lowers the back pressure on the header and mixes and absorbs the relief liquor and gases as they travel downward to the accumulators.

Flows of relief gases and acid can be followed by referring to *Figure 2.* Raw cold acid from the acid storage tank is pumped through the low pressure eductor where it is heated and fortified by gas leaving the high pressure accumulator. Partially heated and fortified acid from the low pressure accumulator is pumped through the high pressure eductor where it is heated and fortified further by the hot relief gases from the digester, and passes on to the high pressure accumulator. Strong hot acid from the high pressure accumulator is used to charge the digesters. The low pressure accumulator relieves into the constant level recovery tank or the raw acid storage tank.

Instrumentation of Chemipulp—KC Direct Cook Digester

As shown in *Figure 1,* the digester differs little from the ordinary sulfite digester. The digester pictured is of the forced circulation type, a suitable arrangement of piping carrying the recirculated acid from a point near the top of the digester, through a pump to the hydroheater where it is heated by direct steam injection, and thence back to the digester. Return acid flow to the digester is split, part entering the bottom and the rest being injected through nozzles in the dome.

The digester is equipped with an acid level recorder, (LR); a recording pressure controller (PRC); a circulating acid flow recorder (FR); a circulating acid recording temperature controller (TRC); a digester temperature recorder (TR); and an integrating steam flow recorder (FRI). Two

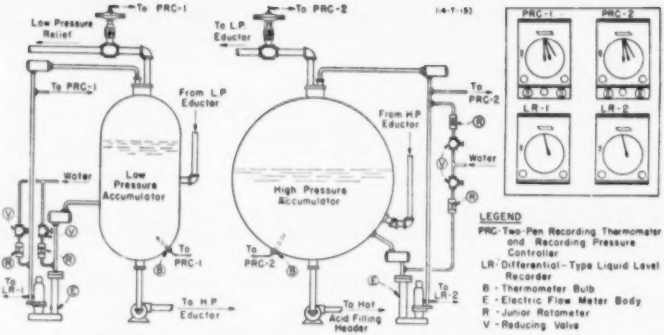

Figure 2. Instrumentation for Chemipulp Hot Acid Recovery System.

Time-Pattern transmitters automatically maintain the desired time-temperature, and time-pressure relationships during the cooking cycle.

ElectroniK Instrument Controls Temperature Of Circulating Acid: Digester temperature is automatically maintained in accordance with a predetermined time-temperature pattern through the combined action of an ElectroniK potentiometer controller (TRC) and a Time-Pattern transmitter (TP). The latter is equipped with a metal cam which is driven by an electric clock motor and shaped to conform to the desired time-temperature curve. A follower, riding on the peripheral surface of the cam causes the instrument to transmit an air pressure which varies as the contour of the cam varies. This air pressure is transmitted to an Indexet within the ElectroniK controller, a device which moves the set point index of the controller up or down scale as the cam on the Time-Pattern transmitter calls for an increase or decrease in temperature.

Since forced circulation is employed, the temperature of the cooking acid leaving the hydroheater is taken as representative of digester temperature, and the thermocouple which actuates the controller just described is inserted directly into the acid circulating line as shown in *Figure 1.* The instrument, of course, operates the diaphragm motor valve controlling steam flow to the hydroheater, admitting more steam as the cam on the Time-Pattern transmitter calls for an increase in temperature.

Time-Pressure Relationship: The time-pressure relationship within the digester is controlled in a similar manner by means of a recording pressure controller (PRC) and another Time-Pattern transmitter (TP-1). This controller operates the diaphragm motor valve which controls digester relief, and, like the temperature controller, incorporates proportional-plus reset action which automatically compensates for any load changes.

Both instruments are equipped with integral by-passes making it possible for the operator to switch from automatic to manual control at any time and to operate either valve manually from the control panel.

Acid Level Continuously Recorded: Continuous and accurate knowledge of acid level within the digester, a factor of particular importance in the Chemipulp Process, is obtained through the use of a differential pressure type liquid level recorder (LR). As shown in Figure 1, corrosive gas and acid, as well as pulp fibers, are prevented from entering the meter body by means of water-purged seal pots. It should be noted that the same purge system also affords protection to the measuring element and connecting piping of the recording pressure controller (PRC).

A Pressuretrol (P) automatically turns on the purge water when the digester pressure falls below the value which is set on this non-indicating controller.

Flow Recorder Affords Check On Acid Circulating System: Flow recorder (FR) supplies continuous indication and record of the flow of cooking acid to the dome of the digester. Any stoppage of strainers or variation in the output of the circulating pump is quickly shown by this instrument.

The addition of a second orifice plate, located in the acid line leaving the digester, and of suitable manifold piping makes it possible to compare the total flow of acid leaving the digester with that portion which is injected back into the dome, thus affording a ready check on the balance between acid flows to top and bottom of the digester.

Automatic Control Of Ratio Between Top And Bottom Flows Available: Through the installation of a Brown Ratio Controller, it is possible to obtain fully automatic control of the ratio of top and bottom flows. In this case, two instruments are employed. An indicator measures the primary flow and transmits its readings pneumatically to a remotely located index positioner in a second instrument which records and automatically controls the secondary flow. The latter instrument incorporates a pointer and scale indicating the base ratio, and

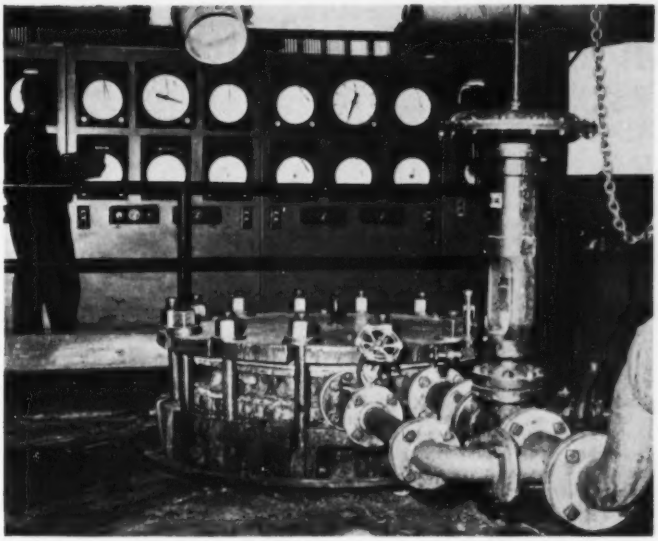

Figure 3. Section of master control cubicle for battery of sulfite digesters. Automatically controlled digester relief valve in right foreground. Courtesy of The Oxford Paper Company, Rumford, Maine.

a knurled knob which permits this ratio to be changed at any time. The recorder, a two-pen instrument, provides a continuous chart record of both primary and secondary flows.

This control system greatly simplifies the otherwise tedious task of balancing out top and bottom flows when a digester is first started up, or when changes in the characteristics of the wood used or the pulp desired necessitate the setting up of a new top and bottom flow ratio.

ElectroniK Instrument Records Top Digester Temperature: A second ElectroniK instrument (TR) provides continuous indication and record of temperature in the upper portion of the digester. As shown in Figure 1, the thermocouple is inserted through the wall of the digester. The information supplied by this instrument is valuable in determining the amount of precirculation required since it affords a ready means of establishing the time at which the entire contents of the digester have reached the same temperature throughout.

Flow Of Cooking Steam Helpful In Cost Accounting: The steam flow recorder (FRI) continuously integrates and records the flow of cooking steam to the digester. Since an electric flow meter is employed, the use of two instruments with one meter body is quite feasible, and some mills prefer an indicator mounted on the digester cubicle, and an integrating recorder in the power plant or turbine room. Indication and record of cooking steam flow facilitates cost accounting and aids greatly in balancing the boiler load.

Master Control Cubicle Offers Many Advantages: The use of master digester control cubicles, as shown in Figure 3, is becoming increasingly popular. In addition to greatly simplifying the duties of the digester cook, these cubicles materially reduce installation time and expense. They can be supplied with all instruments and control devices mounted, and with all back-of-panel wiring and piping completed. Additional accessories such as signal lights, and push-buttons and switches for manually operation of pump motors and valves, can also be included on the cubicle.

Instrumentation of High and Low Pressure Accumulators

Accumulators are pressure vessels used for the recovery and storage of cooking liquor at comparatively high temperatures. They may be either spherical or vertical shells. In some cases, old digesters have been used successfully as accumulators. The spherical shell is more advantageous because of its low static head, large volume per shell area, and the long effective drop leg possible.

The accumulator must be large enough to hold from one-and-one-half to three charges of acid for the largest digester.

Figure 2 shows the recommended instrumentation for high and low pressure accumulators. Each accumulator has its own level recorder (LR-1 and 2) and two-pen recording thermometer and pressure controller (PRC-1 and 2).

Controllers Assure Correct Accumulator Pressures: The pressure controllers measure the pressures existing in the two accumulators, and hold these pressures at the preset values by operating diaphragm motor relief valves. For example, an increase in pressure in the high pressure accumulator above the value set on the controller, causes the instrument to open the relief valve, venting excess pressure to the low pressure eductor. A similar rise in pressure in the low pressure accumulator causes the second controller to relieve this vessel into the constant level recovery or raw acid storage tank.

Second Pen Supplies Record Of Acid Temperature: The use of two-pen instruments permits the recording of both temperature and pressure on a single chart. This is a feature of considerable interest to the operator responsible for the operation of the recovery system. Moreover, it eliminates the need for another instrument, thus reducing the initial cost of the control system.

Continuous Records Of Acid Levels: Differential pressure type liquid level recorders provide continuous and accurate information concerning the acid levels in both accumulators. The meter bodies for these instruments are protected from the corrosive action of the acid and sulfur dioxide gas by a small but constant flow of purge water. The same purge systems provide protection for the measuring elements of the pressure controllers.

Pneumatic Transmission Employed When Recording Controllers Are Remotely Located: In some instances, it is desirable to mount the accumulator control cubicle an appreciable distance from the accumulators proper. For example, it might be advisable to mount it on the digester operating floor when the accumulators are located some distance from the digester building. In this case, pneumatic transmission of instrument readings provides an excellent solution. Indicating instruments, mounted adjacent to the points of measurement, transmit their readings pneumatically to remotely located recorders or recording controllers on the master cubicle. It is necessary to pipe only compressed air at a maximum pressure of 15 psi to the cubicle. Since electrical transmission is normally employed with the liquid level recorders, the remote location of these instruments is practical without any modifications.

Alternate Methods of Hooking Up and Operating Chemipulp system Available

The hookup and operation of the Chemipulp System described in this article are not necessarily the only ones possible with Chemipulp equipment. For example, in some instances only one accumulator may be used; in others the digester relief may be cooled or partially cooled by means of a heat exchanger and raw acid before recovering the desired portion of the relief. For further details, the reader is referred to "Chemipulp Sulphite Mill Opeation," published by Chemipulp Process, Inc., to whom the author is indebted for much of the material in this article.

TAPPI Fourth Engineering Conference

Abstracts of Papers

Modern Paper Mill Buildings

M. C. CELLI
The Rust Engineering Co.

Fortune magazine recently made an amazing statement in an article on "The Beautiful Factories" in saying the better they work the better they look—this could not have been said prewar. Production engineering determines requirements and basic form but architectural design resulting from scientific use of imagination keeps all harmonious and expressive. The best contemporary design of all the component parts of paper mill buildings uses "fitness for purpose" as a common denominator. The processes of equipment operation and building design are inseparable and indispensable. A recovery boiler building is surely a part of the boiler.

Paper mill building cost 20 to 25% of the total project cost. Today they are no longer simple enclosures of space—in order to develop the utmost potential in production, they must provide the best physical environment for each machine and for each individual. An examination of the components to the design of buildings must provide this environment — the structural frame, the walls, the roof, the acoustics, the lighting, the use of color, and the internal atmosphere. There is new emphasis for better employee facilities. An analysis is given of floors and the floor drainage problems with remarks on the corrosion of concrete and masonry caused by fumes and solutions. A study of a semi-open recovery building is presented. Suggestions are made for saving some maintenance costs on buildings with plates detailing eight typical wall sections and eight roof sections, together with a structural and functional analysis of each.

The paper will be illustrated with slides of excellent examples of good contemporary architecture of pulp and paper mills in the United States, Canada, and Finland. It is becoming evident that current advances in design, great as they are, are only a beginning.

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Selection of Paper Machine Drives

ROLAND A. PACKARD
Holyoke Machine Co.

A brief description is given of the paper machine of one hundred years ago. In those early days it was recognized that constant speed was of the greatest importance, but papermakers could not obtain it. Three so-called "rates of motion" were sufficient—high, medium and low. In order to minimize the "great quantities of paper destroyed" due to uneven and changeable speeds required of the different sections of the machine, pieces of felt properly smeared with lagging wax were either applied or torn off. The Marshall train was introduced in 1910. It was heralded as a boon to the papermakers, and it made it possible to double machine speeds. When these speeds attained 600 f.p.m. the increased power demand took its toll on roughening up the wooden teeth on bevel gears, which action developed vibration transmitted to horn couplings, thence to rolls and machine frames. This condition spurred the engineer toward greater improvement in drives. At this time the V-belt made its appearance in power transmission so that short center application made it adaptable for drives. The hydraulic drive together with the hypoid and spherical bevel gears made their debut with the flat belt cone pulley combination. Description is given of each together with relative merits. Machine widths, speeds and horsepowers again began to tax the engineer's ingenuity, which brought out the individual motor on each section of the machine. This was a d.c. unit connected to a synchronous motor. All these motors were tied together electrically. Next came the synchronous regulators followed by amplified electronic systems of control. The development of yardsticks for the mill engineer is shown with a series of graphs relative to speed ranges for different groups of papers and a general selective guide for type of machine drive. The approximate cost per horsepower for different types of drive is given, together with the outstanding features of each type of drive. A number of illustrations and diagrams complete the article.

Beta-Ray Basis Weight Gage

E. A. CRAWFORD
and
M. STRAIN
Continental Paper Co.

A description is given of a recording indicator utilizing a radioactive isotope for the measurement of basis weight on paperboard. Experiments show that using a radio active source actuating a detector, the response was directly proportional to the intensity of the radiation. When consecutive layers of material of uniform density are interposed between the ray source and the detector, the intensity of the beam diminishes as a function of the thickness of the sheet.

Beta rays are used because they are less hazardous to health and provide a steady source of energy. No Geiger tubes are required. The unit is mounted on the machine after the calender stack to measure paperboard continuously, and the recorder can be so adjusted that lights will appear when the weight tolerance is exceeded.

A description of the instrument and its application are given.

Selection of Steam Pressures and Temperatures for Paper Mill Power Plants

M. H. DIXON
and
W. B. WILSON
St. Regis Paper Co.
General Electric Co.

The purpose of this paper is to present various performance data which will enable the paper mill power engineer to select the proper turbine or combination of turbines to give optimum economy and operating flexibility. The data should be particularly useful in studying the mill heat balance to secure the proper relation between electrical power and process steam.

From these data, steam flows, exhaust and extraction temperatures, and electrical energy produced by steam turbine generators for paper mill power plants can be readily determined. By the use of these data the performance of condensing, noncondensing and extraction type turbines can be estimated for a range of initial and process steam pressures.

Suggested Standardization of Spherical Roller Bearings for Wet and Drier Sections of Paper Machines

GEO. H. SPENCER
The Torrington Co.

This paper presents an effort to expand the possibility of standardization of known standard sizes of spherical roller bearings on the wet and drier sections of both cylinder and fourdrinier machines. There would be those special cases such, for example, as extra heavy loaded press rolls for dry pulpmaking machines that will require special treatment of bearing size selection.

Certain locations on this paper machine have been purposely omitted, due to the variety of mechanical designs now in use, but depending on the reaction to the practicability of the bearing data presented in this paper, it may be possible later on to cover such

unmentioned locations as dried pinions, drier intake bearing locations, machine calenders, reels, unwinders, and combination winders and slitters.

The paper begins with a brief review of the basic types of roller bearings available for paper machine applications with emphasis on the spherical roller bearing type which through the years has become increasingly important because of its inherent characteristics to compensate for mis-alignment, its relatively high radial load capacity, and finally, its ability to take thrust in either axial direction.

A carefully chosen division of machine widths and speed groupings has been made, upon which the foundation for the calculations for the suggested standardization of bearing sizes, to give an average life of 15 years has been based. These machine width divisions are 100 to 139 inches: 140 to 179 inches; and 180 to 240 inches, and speed groupings are: up to 800 f.p.m.; 800 to 1500 f.p.m.; and 1500 to 2000 f.p.m.

The suggested bearing standardization may provoke some thought as to subsequent individual builders' own standardization of journal diameters, housing and mounting designs, including framing details, particularly in the drier section of paper machines. Also, the suggested standardization will lower the number of different bearing sizes required as spares.

The bearing load data, insofar as nip pressures in pounds per lineal inch are concerned, are as follows:

1. Between the couch and cylinder molds—50 pounds.
2. Between the felt squeeze rolls—100 pounds.
3. At the primary presses for cylinder machines—250 pounds.
4. At the main presses for cylinder machines—300 pounds.
5. At the main presses for fourdrinier machines—250 pounds.
6. At the smooth press for fourdrinier machines—200 pounds.
7. At the pressure roll of Yankee machines—500 pounds.

There are four complete tables given of the suggested spherical roller bearing sizes. The new AFBMA (Anti-Friction Bearing Manufacturers Association) bearing numbers are shown.

Table I—Wet Section—Fourdrinier machines
—Wet Section—Cylinder machines

Table II—Press Section—both fourdrinier and cylinder machines

Table III—Drier Section—both fourdriner and cylinder machines

Table IV—Yankee Driers and Pressure Rolls

In compiling the bearing data and referring specifically to the speed range "up to 800 f.p.m., it seemed logical that directly after the wet section that the same bearing sizes could be used for both the fourdrinier and cylinder machines. This would mean that the user regarding the press section for the fourdrinier machine would secure more than the predicted average life because of less nip pressure at the fourdrinier presses than at the cylinder presses.

The final part of the paper presents a detailed design discussion of the application of roller bearings to paper and/or felt driers. A table of drier cylinder expansions at different steam gage pressures is given.

Mention is made of the current designs for taking care of the lateral expansion of the paper driers on the front side of the machine, including the methods of using both the flexible vertical springs and the rocker mounting. A new method known as "ladder bearing" is presented with details and illustrations. The new method is now in current use.

Conveyors for Materials in a Pulp and Paper Mill

S. L. FOSTER

Kalamazoo Vegetable Parchment Co.

A description is given of the materials handling facilities of the KVP Co., Ltd., plant at Epanola, Ontario.

Pulpwood is cut and stacked into piles along strip roads. In the winter a special tractor with a fork picks up the pile and loads it on a sled rack. The sleds are then made up into trains of ten or more and hauled to either the river or railroad for transportation to the mill. At the mill, the wood is held in a pond from which it is moved into the mill by a haul-out which transports it to a slasher. Belt conveyors have been used for 4-foot wood. They have some advantage over link conveyors in that they have enough elasticity to absorb the shock of falling wood without damage. Less power is required for the drive and because the belt slides under the wood, there is no danger of damage caused by jamming of the wood in the trough. A weightometer is used to record the digester charge.

Salt cake and lime are handled by a vacuum system by which one man can unload a car in 3 or 4 hours. Lime from the kiln is transported on a specially constructed screw conveyor that is water cooled.

No reserve of coal is held at the mill. The coal is delivered in hopper bottom cars and unloaded directly into the coal bunker.

Practically all baled and lap pulp are handled with trucks. The paper handling system is an overhead tram rail which picks up rolls of paper at the paper machine winders and delivers them to storage, finishing, or shipping areas. A few trucks are used to handle rolls.

The author stresses in conclusion that general consideration for material handling should be to so arrange equipment as to eliminate the need of extra handling, and where materials have to be moved from place to place, to do as much of it mechanically as is possible.

Maintenance Cost in Fine Paper Mills

D. ROSS-ROSS

Howard Smith Paper Mills, Ltd.

Maintenance constitutes about 5% of the sales value of products in the pulp and paper industry, and it is generally recognized that this cost is one of the most difficult to control. Many ways have been devised in an effort to reduce maintenance expenses to a minimum, such as adequate cost control systems using tabulation cards, budgetary systems with or without a monetary incentive for the maintenance staff, and actual wage incentives for all shop employees.

The fine paper industry in Canada is sharing information in which maintenace cost per ton or per hour in the case of paper machines are compared. Further studies are being conducted with a view to relating such cost to insurable values of plant and equipment and to sales dollars.

A questionnaire was sent to eleven mills and figures were obtained for one year. These were not too satisfactory because of the effect on the date of unusual maintenance items, so that study has been expanded to cover a five-year period to give a better average. The problem of comparison is not a simple one because of the differences in the accounting methods employed between different companies.

In addition to some data on the paper plant maintenance, a tabulation is given of the cost of maintenance in 75 Canadian industries.

The Canadian companies are particularly desirous that American mills will wish to participate in the exchange of information and thus make the data more valuable because of the greater extent of the study.

Asbestos Cement Pipe for Overhead Piping Systems

CARL W. ZIEGENBUSCH

The Mead Corp.

The application of asbestos cement pipe for overhead piping systems has presented some interesting problems.

Manufacturing Details of Asbestos Cement Pipe

This pipe is a combination of selected asbestos fibers and cement which is built up on a mandrel by delivering a web of this material onto it. Pressure rolls are continuously run against the mandrel to insure a dense, homogeneous, strong pipe. After the pipe is removed from the mandrel it is properly cured.

Couplings

Many different couplings have been used for putting together asbestos ce-

ment pipe in overhead piped systems. We shall cover mainly the screwed cast iron flange and the implex sleeve coupling which are those most generally used by us.

Practises at Mead

Preparation of asbestos cement pipe for service as flanged pipe include the following steps:

1. Finishing to a specific outside diameter at the ends of each section of pipes. This is done on a lathe and is for the purpose of removing the outer layers of the pipe which often are a bit softer than the remainder of the pipe.
2. Threading the pipe.
3. Screwing on the cast iron flanges, and lining up bolt holes.
4. Finishing ends of pipe and flanges flush after flanges are in place.

Deviations From Flanging

We sometimes deviate from the use of flanged sections of pipe by using short "filler pieces" which are unflanged. By the use of long bolts between flanges on pipe lengths adjacent to these sections we pull up the joints sufficiently to insure a tight line. Rubber ring gaskets seal these joints.

We also use Simplex sleeve couplings as chest inserts and to place short sections of asbestos cement pipe between fixed flanges. The latter usage insures easy installation and removal.

All our experiences with flanged asbestos cement pipe have indicated the extreme importance of the following

1. Flanges must be fitted very tightly to the pipe.
2. The ends of the pipe and flange hubs must be flush.
3. The pipe must be very carefully erected to eliminate strain and must be adequately braced.

If all the above conditions are fulfilled we see no reason why any mill will not find flanged asbestos cement overhead pipe lines as satisfactory as we have found them.

Heating and Ventilating the Minnesota and Ontario Company Bleachery

J. H. DAVIDSON

Minnesota and Ontario Paper Co.

The heating and ventilation equipment provided for the new bleach plant at the International Falls Mills of the Minnesota and Ontario Paper Co., is described. The plant consists of a 100-ton six stage kraft bleachery, a 100-ton two stage hardwood sulphite bleachery, and a provision for a single stage 75-ton groundwood bleachery.

The bleach plant buildings are of structural steel and reinforced concrete construction with brick and tile walls and have a combined volume of 890,000 cubic feet. Air filters, steam heaters, gas absorbers and air tempering recirculation systems are provided. The bleach liquor making building is separate from the main building and has its own heating and ventilation system.

In the design of the main building, the washer or operating room is pressurized and isolated from the remainder of the building to protect the personnel and equipment against exposure to toxic and corrosive gases, chiefly chlorine.

It is expected that the interior of the buildings will be safe and comfortable for operating personnel despite outdoor temperature ranging to 40° below zero, and the prevalence of toxic gases. The heating and ventilating systems are described in detail.

Electrification of a Pulp and Paper Mill The Control of Energy

J. C. LYNCH

Hammermill Paper Co.

This paper describes the electrification of a pulp and paper mill which started operations in 1899. With the exception of a few, initial years of operation, electric power has been utilized for auxiliary drives from the earliest days of the company's pulp and paper making activities, and as far back as 1920 the program of electrification of main drives was started.

Today the company operates a 21,000-k.w. central power station to serve a pulp and paper mill with an average daily output of 300 tons, completely electrified and driven by approximately 1500 motors totalling 28,000 h.p. The paper traces the history of this generating station and the growth of the papermaking facilities and paper production which made it necessary.

However, the paper does more than present a mere chronological record of the electrification. Primary interest is the problem which arose during the course of the electrification program, stressing those which are peculiar to the pulp and paper industry and noting their solution in the light of current knowledge and experience.

Power Requirements for Paper Machines

A. S. GOODRICH

Hammermill Paper Co.

With the development and applicational of sectional electric drives for paper machines, power required for each section can readily be measured. Some of this information has been published in Technical Association Papers previously. From these data constants of power required per inch of width and per 100 feet of speed per minute have been recommended for use to estimate the power required. These constants cannot be considered rigid because corresponding sections of similar machines on similar weights and grades of paper show a variation of 2 to 1. Similar or larger variations have been noted on an individual section of a machine on the same grade and weight of paper.

The trend in paper machine design is for larger and faster machines, making a wider variety of products. Sections for special treatment of the paper have also been added. Nip pressures of press sections are being increased.

Data have been obtained from modern machines installed during the past ten years and used to check or revise the constants.

Data for cylinder and tissue machines are included. Recommended power constants for the various sections of paper machines are included and some of the unusual or special cases that affect power requirements are described. The data are valuable not only for the purpose of selection of drives but as a guide to the machinery builder for checking or improving his design. It is valuable to the paper manufacturer as a guide to the mechanical performance or condition of the equipment and gives a means of finding some of the variables or difficulties of machine operation. It would be very much worthwhile for the paper manufacturer, the machine builder, and the supplier of the driving units to discuss the requirements thoroughly and, therefore, be in a better position to make a proper choice.

The Control of Energy

GEORGE R. HARRISON

Massachusetts Institute of Technology

In his talk Dr. Harrison emphasizes that the prosperity of the nation, and indeed of the world, depends on expansion of industry, and this in turn depends ultimately on the ability of the scientist and of the engineer to harness energy to the uses of mankind. Figures are quoted from several industries to show how research has made possible a better product at a cheaper price, thus increasing sales and boosting both profit and wages. According to Department of Commerce figures, in 1926, 200,000 mechanical refrigerators were sold at an average of $400 apiece. As a result of research and the increased know-how which resulted, a much better refrigerator could be sold ten years later for $160, or less than half as much, so 2,000,000, or ten times as many, refrigerators were sold. In 1909 the average worker could for 1 hour's work purchase enough automobile tires to carry his car for 20 miles. In 1949, for 1 hour's work he can purchase tires enough to carry him 2000 miles —another example of improved standard of living resulting from better control of matter and energy. Such technical progress can be summed up by pointing out that at the time of the American Revolution, eighteen men out of every nineteen had to be farmers in order to feed the nineteen fam-

ilies, whereas today eighteen farmers can feed eighty-five families, thus leaving sixty-seven men to go into other occupations necessary to carry our more advanced social structure.

While science has greatly improved our knowledge of how to control energy in the past fifty years, we will have much to learn. The development of power from the atomic nucleus is only a small part of the problem. Each day more than 200,000 times as much power as is used for all purposes of industry, and transportation falls on the earth from the sun, and to the degree that we learn how to harness this energy will the wealth of the average citizen be increased.

The automobile is cited as an example of a device resulting from very good engineering and very poor science. We use gasoline automobiles because twenty times as much energy can be stored in a pound of gasoline as in 1 pound of storage battery. If a light storage battery could be devised, the automobile could be greatly simplified and the unit cost of transportation greatly diminished.

Most technological progress results from contributions from the three fields: science, applied science, and engineering. As these fields merge, it is not always easy to distinguish one from the other, but in general the scientist explores some field of nature for anything he may find in it, knowing everything he finds will eventually be useful; the applied scientist attacks a specific problem using all available information to develop a phonograph or a radar or an atomic bomb; while the engineer repeats over and over again solutions of problems which are somewhat similar to one another, always keeping the economic aspect foremost in mind, and endeavoring to make each solution more acceptable than the last. Any branch of engineering grows most effectively when the channels between it and the sciences which feed it are kept open.

The importance of keeping balanced the various fields of science, applied science, and engineering, so that the greatest progress might result is emphasized. At the present time scientists have an increasing tendency to throw all of their energy into exploration of the atomic nucleus. This is very important, but it is equally important to keep advancing on an approximately uniform front all branches of science; otherwise, we shall find ourselves increasingly in the situation of the automobile manufacturer, who doesn't know how to control energy well enough to put it into a light storage battery, and hence must use gasoline engines which are not even able to start themselves.

The speaker emphasizes the role of energy in raising the subsistence level of retarded areas. He believes that too much emphasis is placed on conflicting ideologies as responsible for our present world difficulties, and too little responsibility is assigned to the situation of people who just do not have enough to eat. The scientists and engineers of America have an opportunity to make a contribution to world freedom such as never existed before.

Effect of a Carbon Powder Preparation on Plain Carbon Steels

P. J. WILSON
Wilson Carbon Co.

The results of laboratory tests on a new carbon base compound that has some unusual properties as a case hardening compound when heat treating plain carbon steels are presented. The tests included studies of the case depth produced, the time and temperature to produce these case depths, the hardness of the case, and the band and tensile properties of the study. The data are presented in the form of tables and curves.

Recovery of Waste Heat in Pulp and Paper Mills

D. K. DEAN
Manager, Industrial Division,
Foster Wheeler Corporation

(1) Appreciable savings in sulfate and soda mills may result in the heating of wash water by the recovery and use of the heat contents of relief steam and steam flashed on digester blowdown.

The relief steam for a 100-ton pulp mill will supply sufficient heat to heat continuously through the 24 hours about 210 gallons per minute per ton of pulp, plant rating, through a temperature range of 80°.

(2) The steam exhausted in digester relief may also be condensed and used to heat water or cooking liquor. The cooking of resinous pulp releases quantities of turpentine which may also be recovered. The quantities recoverable range from 2½ to 4 gallons per ton of pulp.

(3) In sulfite mills, although there may not be the use for heated water, appreciable amounts of SO_2 may be recovered from the digester blow steam.

From 80 to 100 pounds of SO_2 per ton of pulp are recoverable from blow steam with concentrations up to 4 percent.

(4) In de-inking plants heat derived from the cooling of digested paper may be utilized in preheating the digesting solution with about 60 percent recovered heat.

(5) Heated air with high moisture content exhausted from machine rooms and dryer equipment contains an appreciable amount of heat which may be recovered in the preheating of air for the dryer or for the preheating of water.

(6) Steam accumulators offer opportunities for economies in steam generation and turbine operation. Steam required to meet peak demands for digester heating may be stored in an accumulator during off-peak periods with the resultant smoothing of the demand on the boilers and particularly on the turbine extraction system, if used.

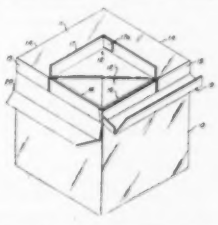
The accumulator offers an excellent method of balancing the steam demand load.

Patent Abstracts

● ***In addition to abstracts on the technology of pulp, paper and related industries, miscellaneous abstracts which may provide useful information are included.***

2,473,391 — Container. Walter A. Roselle, New York, N. Y. Filed October 23, 1946—Issued June 14, 1949.

A container formed of paper and comprising a



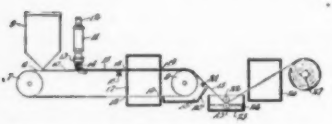
body portion of angular cross-sectional shape and a top portion having flanges overlapping at least two adjacent side edges of the body, said top being scored across the corner intervening said side edges to fo m a closure and said flanges being interrupted at the ends of said scores to facilitate hinging of the corner of the top along the scored line, and sealing strips secured to the outer edges of the body portion along said adjacent side edges beneath said flanges and extending around the outside of said flanges and covering the interrupted portions of said flanges and extending over the outer edges of the corner of the top portion and sealing the outer edges of the flanges along said adjacent sides of the top portion, said extended portions of said strips being detachably sealed to the outer surfaces of the top portion.

2,473,473—Method of Preparing Regenerated Cellulose. Gordon D. Hiatt and Carlton L. Crane, Rochester, N.Y., assignors to Eastman Kodak Company, Rochester, N. Y. Filed February 5, 1945—Issued June 14, 1949.

A method of preparing regenerated cellulose which comprises mixing together at a temperature not to exceed 37° F. cellulose having a viscosity not to exceed 200 centipoises, N_2O_4, an inert solvent compatible with N_2O_4 containing between 0.5 and 20% of water, and 0.5-20% of water, based on the weight of the N_2O_4, until solution of the cellulose occurs, followed by imparting a physical form to the solution and setting the so-formed solution.

2,473,528 — Unwoven Filamentary Web and Method of Producing Same. Howard L. Hoover, St. Paul, Minn., assignor to Minnesota Mining & Manufacturing Company, St. Paul, Minn. Filed August 14, 1946—Issued June 21, 1949.

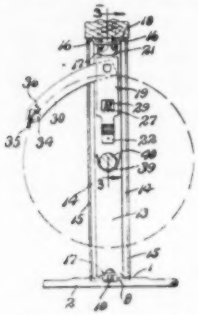
The method of producing a web of artificial



filaments comprising extruding plastic spinning material into a plurality of filaments and depositing said filaments in overlapping relation, while still sufficiently plastic to adhere to one another and to particulate material, upon a support coated with said particulate material, whereby some of said particles becomes bonded to said filaments and said filaments are bonded to each other prior to the evaporation of said solvent.

2,473,744 — Paper Roll Holder Elvah O. Bulman, Grand Rapids, Mich. Filed April 7, 1947—Issued June 21, 1949.

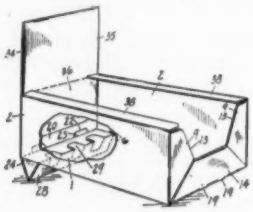
In a paper roll holder, a supporting frame including two spaced apart standards, a base supporting member at the lower end of each stand-



ard, said standards and base supporting members having parts slightly spaced from each other, means for connecting such standard to its base support including bolts and nuts, the bolts passing through said spaced parts of said standards and supporting members, said parts being yieldingly resistant and sprung towards each other and exerting pressure upon the bolt heads and nuts to prevent relative movement of the bolts and nuts with respect to each other, a transverse bar across the upper ends of the standards, bolts passing through said standards and the upper ends of the bar, said upper ends of the standards having yieldingly resistant portions spaced from the bar deformed by the bolt connections and nuts on the bolts to exert deforming pressure on said yielding portions.

2,473,635—Display Carton with Support. Kenneth T. Buttery, Kalamazoo, Mich., assignor to Sutherland Paper Company, Kalamazoo, Mich. Filed October 8, 1945—Issued June 21, 1949.

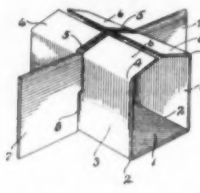
A display carton formed of an integral blank and comprising a bottom, side walls hingedly joined to the side edges of the bottom and provided with inturned cover supporting flaps at their upper edges, outer rear wall members on the rear ends of said side walls having overlapping interlocking engagement, an inner rear wall hingedly connected to the rear end of the bottom and disposed on the inner side of the outer rear wall members and supported thereby and having laterally spaced inverted U-shaped slits and a transverse score line joining the slits at the lower ends thereof providing a rear easel member with



tongues at the upper edge thereof, the bottom having slits extending forwardly from adjacent the rear corners thereof and having a plurality of laterally spaced forwardly facing U-shaped slits adjacent its rear end and a transverse score joining all the slits at the forward ends thereof providing a front easel member hingedly joined to the rear easel member, the erection of the easel resulting in an open space across the plane of the bottom, said forwardly facing U-shaped slits providing supporting tongues disposed in the plane of the bottom and extending rearwardly over the open space resulting from the erection of the easel, the said tongues on the rear easel member being engaged with the bottom edges of the outer rear wall members when the easel is erected, and a cover hingedly joined to the upper edge of said inner rear wall member, said cover closure flap being disposed in forward parallel relation to said outer rear wall members when said cover is in said upright position and said easel is in erected position.

2,473,706—Box Partition. Ralph C. Richey, Chicago, Ill., assignor to American Box Board Company, Grand Rapids, Mich. Filed July 26, 1948—Issued June 21, 1949.

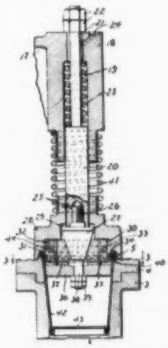
A box partition structure comprising, a rectangular sheet of paperboard having a transversely disposed rectangular bottom section be-



tween the ends thereof and located symmetrically with respect to said ends, an integral rectangular section extending from each side of said first mentioned rectangular section, there being bending lines between the adjacent edges of said first and second rectangular sections, and additional bending lines parallel to the first lines between said second mentioned rectangular section and the adjacent ends of the material sheet, said material sheet from each end thereof and between its sides having a slot extending from the adjacent end substantially half through the second mentioned rectangular section, whereby said material sheet is foldable into a structure having a horizontal bottom, vertical sides and inwardly extending separated flaps at the upper edges of said sides, and a second member of flat paperboard material of rectangular form having a width substantially equal to the width of the second mentioned rectangular sections of the first described member and twice slotted from one longitudinal edge thereof substantially half the width, said slots being spaced from each other a distance substantially equal to the width of the first mentioned rectangular section of the first described member.

2,473,836—Paper Cup Beader. Paul E. Wixon and Clarence E. Chapman, Baltimore, Md., assignors to Joseph Shapiro. Filed January 29, 1948—Issued June 21, 1949.

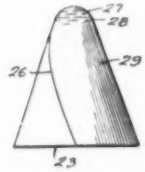
In a cup making machine wherein a paper cup is held in a conical holder having a conical anvil insert having an upstanding annular top end: a vertically movable bracket having a head with a spindle bearing; a spindle longitudinally



movable in said head; a cover for the top end of the cup and fitting over the top edge of the anvil insert and having a stepped recess of two diameters, said head being mounted on said spindle; a segment beader having an annular flange and being located in part in the recess of the larger diameter in said cover and having an annular groove; a spring in said groove for holding the segments of the beader together; a nose on said spindle and projecting through the center of said segmental beader and having a wedging engagement with the segments; a beader cup clamp on the projecting end of said nose and supporting said segments, said clamp having radial grooves and said segments having pins guided in said grooves; a spring continuously urging said spindle in one direction; and means to limit the spindle movement in said direction, said anvil having a bead-forming groove into which the flange on the segmental beader presses the cup material.

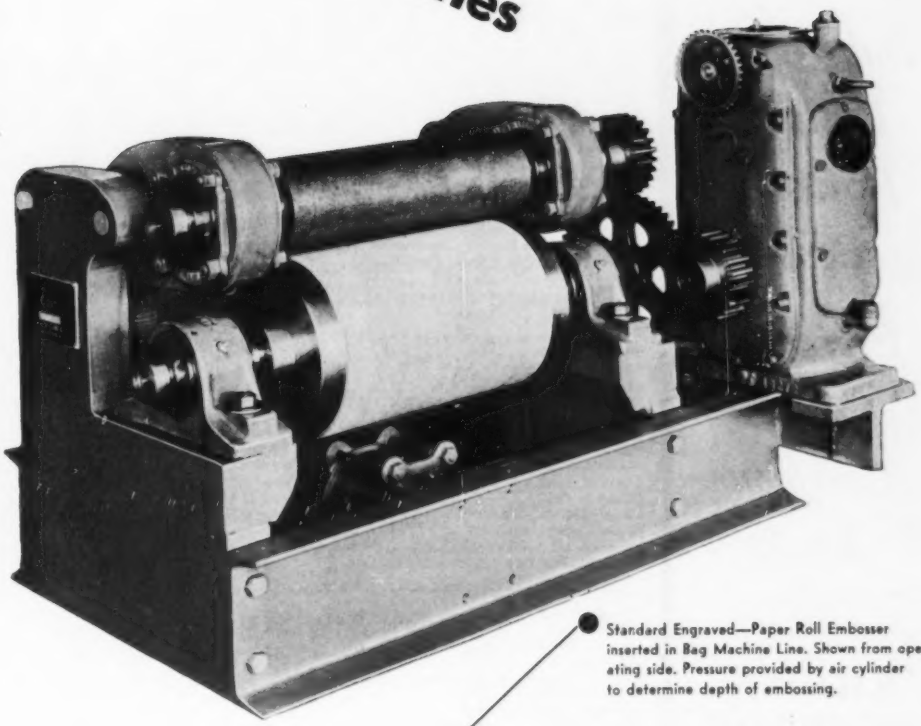
2,473,840—Conical Paper Cup with Rounded Bottom. Walter E. Amberg, Beverly Shores, Ind., assignor to Lily-Tulip Cup Corporation. Filed December 4, 1947—Issued June 21, 1949.

A truncated conical single piece paper cup



of less than sixty degree angle comprising an acute angled substantially smooth frustro-conical side wall and a substantially inner concave spoon serviceable pleated bottom merging with rality of circumferentially disposed apexially the side wall, said bottom only having a plugathered pleats.

embossing machines



Standard Engraved—Paper Roll Embosser inserted in Bag Machine Line. Shown from operating side. Pressure provided by air cylinder to determine depth of embossing.

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FINANCIAL RECORD •

PREFERRED STOCKS	Per Share Earnings Calendar Year 1948	Per Share Earnings 12 Mo. to Approx. 9/30/49	Indic. Annual Divid. Rate	Nov. 15 Approx. Market Price
Armstrong Cork Co. $3.75 Cum.	$46.33*	$38.47*a	$3.75	$99¾
Armstrong Cork Co. $4.00 Cum. Conv.	46.33*	38.47*a	4.00	112¾
Celotex Corp. 5% Cum.	26.42c	10.33p	1.00	16¾
Champion Paper & Fibre $4.50 Cum.	99.97f	19.91j	4.50	95⅞
Container Corp. of Amer. 4% Cum.	105.41	90.43	4.00	100½
Crown Zellerbach $4.20 Cum.	63.92i	61.00p	4.20	101¼
Crown Zellerbach $4.00 Cum. Conv. 2nd	60.56i*	57.90p*	4.00	98½
Dixie Cup Co. $2.50 Cum. Conv. Cl. A	10.10	10.44	2.50	50½
Flintkote Co. $4 Cum.	83.25	61.44	4.00	104¼
Robert Gair Co., Inc. 6% Cum.	17.08	12.88	1.20	17⅝
International Paper Co. $4 Cum.	263.00	245.41	4.00	102½
Johns-Manville $3.50 Cum.	209.89	204.89	3.50	116¾
Kimberly Clark Corp. 4½% Cum.	80.74	70.92	4.50	102½
Kimberly Clark Corp. 4% Cum. Conv. 2nd	41.59*	42.20*	4.00	102¼
MacAndrews & Forbes 6% Cum.	62.23	64.10	6.00	138½
Mead Corp. 4¼% Cum.	73.46	49.00k	4.25	93½
Mead Corp. 4% Cum. Conv. 2nd	29.91*	19.93k*	2.00	32⅛
Paraffine Cos. Inc. 4% Cum. Conv.	156.11	74.77	4.00	102½
Rayonier Inc. $2 Cum.	16.43	10.76	2.00	30⅞
St. Regis Paper Co. 4.40% 1st A	79.90	34.21	4.40	84½
Scott Paper Co. $3.40 Cum.	59.06	52.36	3.40	97¾
U. S. Gypsum Co. 7% Cum.	314.45	281.64	7.00	186½
United Wallpaper Inc. 4% Cum. Conv.	(d)0.79	15.43	2.00	24½
West Virginia Pulp & Paper 4½% Cum.	79.45c	69.93p	4.50	107¼
COMMON STOCKS				
APW Products Co.	$0.73	(d)$0.56a	(m)	2⅞
American Writing Paper Corp.	(d)0.15	0.05	$0.25	6⅛
Armstrong Cork Co.	7.54	6.13a	3.00	47¾
Celotex Corp.	7.21c	2.75p	1.00	17¾
Certain-Teed Prods. Corp.	4.02	3.21a	1.00	13⅝
Champion Paper & Fibre	8.70f	1.70j	2.00	26⅝
Congoleum Nairn Co.	5.78	4.92a	2.00	29¼
Container Corp. of America	10.12	8.50	4.50	38
Crown Zellerbach	7.16i	6.68p	2.00	28
Dixie Cup Co.	6.70	7.00	1.50	35⅝
Eastern Corp.	4.76	d0.07	(h)	13⅞
Flintkote Co.	5.86	4.14	2.50	28½
Robert Gair Co., Inc.	2.67	1.96	0.70	6¾
Great Northern Paper Co.	4.63	5.32a	2.80	39⅝
International Paper Co.	16.73	15.59	5.00	62¾
Johns-Manville Corp.	5.22	5.07	2.00	43⅜
Kimberly Clark Corp.	5.02	4.32	1.65	23⅝
MacAndrews & Forbes Co.	3.68	3.79	2.50	36½
Marathon Corp.	4.11e	3.42p	1.40	22⅞
Mead Corp.	6.36	3.98k	1.00	12⅞
National Container Corp.	2.28	1.38a	0.40	6¾
Paraffine Cos. Inc.	2.45	1.15	1.20	18⅛
Rayonier, Inc.	9.09	5.52	2.00	23⅞
Ruberoid Co.	11.80	9.37	3.25	57⅛
St. Regis Paper Co.	2.71	1.02	0.60	7⅛
Scott Paper Co.	4.15	5.38	3.00	65
Sutherland Paper Co.	6.02	5.12	2.50	35¾
Union Bag & Paper Corp.	9.17	5.36	3.00	25½
United Board & Carton	2.04b	(d)1.72g	(e)	8
U. S. Gypsum Co.	15.04	13.43	9.00	103½
United Wallpaper	(d)0.10	0.42	(n)	3⅛
West Virginia Pulp & Paper	11.33e	9.70p	3.00	45¾

(a) 12 months to approximately 6/30/49
(b) Year ended 11/23/48
(c) Year ended 10/31/48
(d) Deficit
(e) Omitted dividend 2/4/49
(f) 11 months to 3/31/49
(g) 12 months to approximately 8/20/49
(h) Directors took no action on August, 1949 dividend—last payment 5/2/49
(i) 12 months to approximately 1/30/49
(j) 3 months to 6/30/49
(k) 12 months to approximately 10/2/49
(m) Directors took no action on July, 1949, dividend—last payment 1/10/49
(n) Last payment 25c, 9/16/47
(p) 12 months to approximately 7/31/49
(*) Earnings per combined preferred shares.

Dividends Declared

International Paper Co., on November 9 declared an additional year-end dividend of $1 a share on its common stock and regular quarterly dividend of $1 on the common stock. Also a dividend of $1 per share on its cumulative $4 preferred stock. All dividends are payable December 15 to holders of record November 21.

Powell River Co., Ltd., has declared an extra dividend of 85 cents and the regular quarterly dividend of 50 cents, both payable December 15 to holders of record November 24.

Eddy Paper Co., Ltd., has declared a regular 25-cent quarterly dividend on its Class-A shares, payable December 15 to holders of record Nov. 18.

PRICES

The prices below reflect general market quotations applying to those standard grades in which the normal volume of business is being done.

NEW YORK

Delivered New York

Standard News, per ton—

Rolls, contract	$100.00/ —
Sheets	115.00/ —

F.o.b. Mills, Carload freight allowed, dock N. Y.

Kraft— per cwt., 40# base wgt.

Standard Wrapping Rolls	$6.50/ —
No. 1 Wrapping Rolls	7.25/ —
Standard Bag	6.00/ —

Tissues— per ream 24x36 (480) 10 lbs. 2500 lbs. or more

Wh. No. 1 Frd.	$155.00/ —
Wh. No. 1 M. G.	150.00/ —
Wh. No. 1½	140.00/ —
Wh. No. 2	120.00/ —
Kraft Anti-Tar	1.37½/ —
Shrd. Wh. No. 1 per lb.	.11½/ —

Toilet— per case of 100 rolls—1 M sheets.

Unbleached 4½x4½	$5.75/ —
Bleached 4½x4½	6.95/ —
Bleached 4½x5	8.80/ —
Per Case of 50 rolls—2000 sheets	
Unbleached 4½x4½	$5.75/ —
Bleached 4½x4½	6.80/ —
Per Case of 100 rolls—1000 sheets	
Facial, 4½ x 5, 2 ply	$8.95/$9.45

Paper Towels—per case of 3750—Zone 1.

Wh. Jr. M'tif'd 9¼x9½	$5.25
Br. Sr. M'tif'd 10x12	3.60
Br. Jr. M'tif'd 9½x9¼	3.10
Br. Jr. Sgl. fold 10x10¾	3.15
Blchd. 7½ x 11, 24/25 rolls	$3.95/$6.25

Manila, per cwt.

No. 1 Jute Tag 40 lb., sheets*	$15.05/$17.50
Reg. Jute M.F. Manila, sheets*	13.50/ 15.50
Wrapping Manila	8.75/ 10.50
Printing Manila	10.00/ 11.00

* Less usual allowance for rolls.

Boards, per ton—

Filled News	$77.50/ —
Plain Chip	75.00/ —
Blchd. Mla. L-d. Chip*	92.50/ —
White Pat. coated*	110.00/
Kraft Liners 42 lb.	100.00/
Kraft Corr. .009	105.00/
Binders Boards	110.00/116.00

* Base Prices per 10 tons. Less than 10 tons but over 3 tons, add $2.50; three tons or less, add $5; regular 35-39 basis, add $5; basis 40-49, add $2.50; basis 91-100, add $2.50; basis 101-120, add $5.

WORLD WOOD PULP MARKETS

Fourth Quarter Contract Prices, Per Short Air-Dry Ton

	Delivered, with varying freight allowances		On dock Atlantic Ports Full freight allowance		
	U. S.	Canadian	Swedish	Finnish	Norwegian
Groundwood	$65.00/ —	$65.00/ —			
Soda, Bleached	113.00/ —	113.00/ —		Competitive	
Sulphate, Bleached	118.00/126.00	126.00/ —	125.00/128.00		
Sulphate, Unbl'd North'n		82.50/105.00	82.50/ 85.00	with	
Sulphate, Unbl'd South'n	80.00/ 82.50				
Sulphite Blchd. (S'ftw'd)	118.00/ —	118.00/ —	118.00/ —	Domestic	Competitive
Sulphite, Blchd. (H'dw'd)	113.00/ —				
Sulphite, Unbleached	100.00/ —	100.00/ —	100.00/ —	Grades	
Sulphite, Unbl'd (Glassine)	105.00/ —	105.00/ —	104.00/105.00		

WASTE PAPER MARKET

Prices to Mills*, (Per Ton) F.o.b. Cars Shipping Point

	New York	Philadelphia	Boston	Chicago
	Nov. 10	Nov. 1	Nov. 1	Nov. 1
No. 1 Mixed Paper	$7.00/ $9.00	$7.00/ $9.00	$7.00/ —	$10.00/ —
Boxboard Cuts	7.00/ 9.00	6.00/ 7.00	— / 5.00	13.00/ —
Mill Wrappers	11.00/ 12.00	9.00/ 11.00	— / 9.00	12.00/ —
No. 1 News	10.00/ 11.00	9.00/ 10.00	9.00/ 10.50	16.00/ —
Over-issue News	14.00/ 15.00	12.00/ 14.00	8.00/ 10.50	19.00/ —
Corrugated Containers	13.00/ 15.00	15.00/ 17.00	14.50/ 15.50	20.00/ —
New Corrugated Cuts	18.00/ 20.00	20.00/ —	16.00/ —	23.00/ —
Double Kraft Ld. Corr. Cuts	34.00/ 35.00	30.00/ 35.00	25.00/ —	35.00/ —
Used Kraft Bags	25.00/ 30.00	20.00/ 22.00	25.00/ 30.00	20.00/ —
No. 1 Brown Kraft Paper	25.00/ 30.00	25.00/ 30.00	30.00/ 35.00	20.00/ —
Super Resorted Br. Kraft	30.00/ 35.00	35.00/ —	40.00/ —	35.00/ —
New Br. Kraft Env. Cuts	65.00/ 70.00	60.00/ 65.00	60.00/ 65.00	55.00/ —
New Br. Kraft Cuts	40.00/ 45.00	50.00/ —	45.00/ —	50.00/ —
No. 1 Gdwd. Shvs.	15.00/ 20.00	15.00/ 20.00	25.00/ —	26.00/ —
White Newsblanks	50.00/ 55.00	40.00/ 45.00	50.00/ 55.00	35.00/ —
No. 1 Flyleaf Shvs.	25.00/ 30.00	25.00/ 30.00	35.00/ 45.00	35.00/ —
No. 1 Soft Wht. Shvs.	75.00/ 80.00	60.00/ 65.00	70.00/ 80.00	55.00/ —
Super Soft Wht. Shvs.	90.00/100.00	70.00/ 75.00	80.00/ 90.00	60.00/ —
Hd. Wht. Shvs.	85.00/ 95.00	80.00/ 85.00	80.00/ 90.00	80.00/ —
Hd. Wht. Env. Cuts.	95.00/105.00	90.00/ 95.00	90.00/105.00	90.00/ —
New Manila Env. Cuts.	65.00/ 70.00	60.00/ 65.00	60.00/ 70.00	55.00/ —
Col. Tab Cards	30.00/ 35.00	20.00/ 25.00	35.00/ —	40.00/ —
Manila Tab Cards	65.00/ 70.00	65.00/ 70.00	75.00/ 80.00	65.00/ —
No. 1 Mixed Ledger	30.00/ 32.50	27.50/ 32.50	37.50/ —	40.00/ —
White Ledger	45.00/ 55.00	40.00/ 45.00	50.00/ 60.00	50.00/ —
Mixed Books & Mags.	7.00/ 8.00	9.00/ 10.00	12.00/ —	12.00/ —
No. 1 Rep'd Hvy. Books & Mags.	20.00/ 25.00	20.00/ —	22.00/ 23.00	23.00/ —

* Includes brokers' fee.

The following prices are representative of distributors' resale prices, all deliveries in Zone 1:

Rag Content Bonds and Ledgers—

White, 20 lb.

Bonds

	4 Ctns.
	per cwt.
100% Rag Ex. No. 1	$51.40/$53.90
100% Rag	44.55/ 46.15
75% Rag	33.90/ 35.40
50% Rag	28.10/ 29.55
25% Rag	24.85/ 26.80

Ledgers

	4 Ctns.
	per cwt.
100% Rag Ex. No. 1	$52.65/$54.55
100% Rag	45.65/ 46.40
75% Rag	35.15/ 36.10
50% Rag	29.40/ 30.05
25% Rag	26.15/ 26.80

Sulphite Bonds and Ledgers

White, 20 lb.

Bonds

	4 Ctns.
	per cwt.
No. 1	$17.50/ —
No. 2	16.55/ 16.75
No. 4	15.60/ 15.95

Ledgers

	4 Ctns.
	per cwt.
No. 1	$18.80/ —
No. 2	18.05/ —

White Book

	Conversion Coated	Case
		per cwt.
No. 1		$19.75/$20.90
No. 2		19.25/ 19.65
No. 3		17.75/ 18.90
	Machine Coated	
No. 1		16.40/ 16.65
No. 2		14.40/ 15.15
	Uncoated	
No. 1 Antique (Watermarked)		16.40/ 17.90
Offset		15.15/ 16.65
A Grade E. F.		15.40/ —
A Grade S. C.		15.90/ 16.15
B Grade E. F.		14.90/ 15.15
B Grade S. C.		15.40/ 15.65

Twines

All Prices Nominal, F.o.b. Mill

(Soft Fiber)	
Coarse Polished—India	.35½/ .36½
Fine Polished India	.41½/ .45
Unpolished—Paper Makers	.32½/ .34½
Tube Rope	.33¼/ .35½
Wrapping	.36 / .38¼
Cotton	.58 / .60
Polished Cotton	.55 / —
(Hard Fiber)	
Mex. Sisal	.21 / .27
(American Hemp)	
Polished Hemp	.45 / .48
Unpolished	.35 / .37½

Rag Market

New Domestic Cotton Cuttings

(Prices to Dealers, F.o.b. Ship. Pt.)

	Per 100 lbs.
White Shirt	$10.00/ $10.50
Unbleached Muslin	10.00/ 10.50
Light Silesias	7.00/ 7.50
White Back Blue Overalls	5.50/ 6.00
Blue Overalls	4.50/ 5.00
Fancy Shirt	4.50/ 5.00
Percales	5.50/ 6.00
Light Prints	5.50/ 6.00
No. 1 Washables	2.75/ 3.00
Bleachable Khaki	4.75/ 5.00
Unbleachable Khaki	4.00/ 4.50
Cottonades	4.25/ 4.75
Lt. Flanneletes	6.75/ 7.25
Men's Corduroy	3.50/ 4.00
Women's Corduroy	3.00/ 3.50

Old Domestic Cotton Rags

(Prices to Dealers, F.o.b. Ship. Pt.)

	Per 100 lbs.
No. 1 Whites, Repacked	$4.25/ $4.75
No. 1 Whites, Miscellaneous	3.50/ 4.00
No. 2 Whites, Repacked	2.75/ 3.00

No. 2 Whites, Miscellaneous	2.00/	2.25
Cotton Pants & Overalls	2.50/	2.75
Thirds and Blues, Repacked	2.00/	2.25
No. 1 Roofing Rags	1.50/	1.55
No. 2 Roofing Rags	1.40/	1.45
No. 3 Jute Baggings	1.25/	1.30
No. 4 Brussels & brd. Bek'd srpts.	.90/	1.00
Roofing Bagging	.80/	.95

New Foreign Cotton Cuttings

(Prices to Mills, F.o.b. Dock, N. Y.)

	Per 100 lbs.
New Dark Cuttings	prices are nominal
New Mixed Cuttings	
Light Silesias	
Light Flannelettes	
New White Cuttings	
New Unbleached Cuttings	
Fancy Shirt Cuttings	
Light Prints	
Bleachable Khaki, No. 1	
Unbl. Khaki, No. 1	

Old Foreign Rags

(Prices to Mills, F.o.b. Dock, N. Y.)

	Per 100 lbs.
No. 1 White Cottons	prices are nominal
No. 2 White Cottons	
No. 3 White Cottons	
No. 4 White Cottons	
Extra Light Prints	
Old Light Prints	
Med. Light Prints	
Dutch Blue Cottons	
Checks and Blues	
Linsey Garments	2.10/2.40
Dark Cottons, European	1.85/2.10
Dark Cottons, Egyptian	
Old Shopperies	
New Shopperies	

Bagging

(Prices to Dealers, f.o.b. N. Y.)

	Per 100 lbs.	
Foreign Gunny	$5.00/	5.50
Domestic Gunny, No. 1	6.00/	6.50
Heavy Wool Tares	6.00/	6.50
No. 1 Scrap Bagging	4.00/	4.50
Foreign Manila Rope	5.00/	5.25
Domestic Manila Rope	5.00/	5.25
Jute Strings	5.50/	5.75
No. 1 Sisal Strings	3.50/	4.00
Mixed Strings	1.15/	1.30

PHILADELPHIA

New Domestic Cotton Cuttings

(Prices to Dealers, F.o.b. East'n Ship. Pt.)

	Per 100 lbs.
White Shirt	$10.00/$10.50
Fancy Shirts	4.50/ 5.00
Light Silesias	6.50/ 7.00
Unbleached Muslin	9.75/ 10.25
Light Prints	5.25/ 5.75
Washable No. 1	2.50/ 3.00
Blue Overall	5.75/ 6.25
Percales	5.50/ 6.00
Bleachable Khaki	4.50/ 5.00
Unbleachable Khaki	3.25/ 3.75
Men's Corduroy	3.75/ 4.25
Ladies' Corduroy	3.25/ 3.75
Cottonades	4.00/ 4.50

Old Domestic Cotton Rags

(Prices to Dealers, F.o.b. East'n Ship. Pt.)

	Per 100 lbs.	
Mixed White	$2.75/	$3.50
Thirds and Blues Repacked	2.50/	2.75
Cotton Pants & Overalls	2.40/	2.75
No. 1 Roofing Stock	1.20/	1.50
No. 2 Roofing Stock	1.10/	1.40
Roofing Bagging	1.00/	1.10

Bagging

(Prices to Dealers, F.o.b. East'n Ship. Pt.)

	Per 100 lbs.	
Old Manila Rope	$5.00/	$5.25
Foreign Gunny No. 1	6.75/	7.00
Domestic Gunny, No. 1	6.75/	7.00
Sisal Strings No. 1	3.00/	3.50
No. 1 Scrap	4.00/	4.50
No. 1 Jute Rope	5.50/	6.00

BOSTON

Bagging

(Prices to Dealers, F.o.b. Boston)

	Per 100 lbs.	
Foreign Gunny	$5.00	/$6.00
Domestic Gunny	5.00	/ 6.00
Domestic No. 1 Old Rope	5.00	/ 5.25
Foreign No. 1 Old Rope	5.00	/ 5.25
Mixed Strings	1.35	/ —
Transmission Rope—Domestic	3.00	/ 3.50
Jute Carpet Threads	—	/ 2.00
Bleachery Burlap	—	/ 9.00
Scrap Burlap—		
Foreign	4.00	/ 4.50
Domestic	4.00	/ 4.50
South America	5.00	/ 5.50
Austr. Wool Pouches	6.50	/ 7.00
New Zealand Wool Pouches	—	/ 4.00
New Burlap Cuttings	6.00	/ 7.00
Heavy Baling Bagging	7.50	/ 8.00
Paper Mill Bagging	—	/ 3.50

Domestic Rags (new)

(Prices to Dealers, F.o.b. Boston)

	Per 100 lbs.	
New Light Prints	5.75	/ 6.00
Fancy Percales	6.25	/ 6.50
White No. 1 Shirt	10.00	/10.75
Light Flannelettes	—	/ 7.00
Canton Flannels, Bleached	—	/ 9.00
Underwear Cutters, Bleached	10.75	/11.25
Underwear Cutters, Unbleached	10.00	/10.25
Blue Overalls	6.00	/ 6.50
Soft Unbleached	9.75	/10.50
Blue Cheviots	6.00	/ 6.50
Fancy Shirt	4.00	/ 4.50
Washable	3.00	/ 3.25
Khaki Cuttings	5.00	/ 5.25
Men's Corduroy	4.50	/ 5.00
Khaki Canvas	—	/ 5.50
B. V. D. Cuttings	10.00	/10.25

Domestic Rags (old)

(Prices to Dealers, F.o.b. Boston)

	Per 100 lbs.	
No. 1 Whites, Repacked	$4.00	/$4.50
No. 1 Whites, Miscellaneous	2.50	/ 3.00
Twos and Blues, Repacked	2.50	/ 2.75
Cotton Pants & Overalls	2.50	/ 2.75
No. 1 Roofing Stock	1.75	/ 1.80
No. 2 Roofing Stock	1.50	/ 1.55
Roofing Bagging	1.30	/ 1.45

MATERIALS

Blanc Fixe

Prices firm. Supply adequate. Heavy demand. Currently quoted at $85.00 in bags, car lots, at works, 6 cents per pound, l.c.l., deld. By-product supply somewhat restricted. Quoted at $77.50 per ton, car lots, at works, 6 cents per pound, l.c.l., deld.

Bleaching Powder

Demand improved. Prices steady. Prices range from $4.50 to $5.00 per 100 pound drums, l.c.l., works.

Casein

Argentine flush season underway. Production good. Prices firm with strong undertone. U. S. supply light. Current prices on processed acid precipated grades 22½ to 23 cents, imported grades 19½ to 20 cents, ex dock, N. Y. car lots.

Caustic Soda

Demand heavier. Stocks adequate for prompt shipment. Contract prices for 1950 unchanged. Solid caustic is reported at $3.05 per cwt. flaked and ground is quoted at $3.45 per cwt., in 400 pound drums, $3.95 per cwt. in 100 pound drums —car lots, at works; liquid 50 percent in tank cars at $2.40 per cwt.; liquid 73 percent in tank cars at $2.50 per cwt., at works.

China Clay

Demand strong. Supply of domestic and imported ample. Domestic airfloated filler quoted at $10 per ton, water-washed $11.00, car lots, f.o.b. mines. Coating clay is $16 to $30. Imported clays repriced to $15.20 and $28.35 short tons, export warehouse.

Chlorine

Demand strong. Supply condition tighter. Prices firm at present levels for 1950 contracts. Currently quoted at $2.40 per cwt. in single unit tank cars; at $2.70 to $3.90 per cwt. in multi-tank cars, f.o.b., works.

Rosin

Demand spotty. Prices fluctuate daily. Expect early decision on loan. Foreign inquiry is price wise. Gum rosin in drums per 100 pounds net in car lots, f.o.b. Savannah, B, $5.75; G, H, I, K, $6.54; wood rosin, per 100 lbs., car lots, f.o.b. Savannah; B, $4.25; FF, $5.50.

Rosin Size

Demand steady. Supply good. Seventy percent gum and pale wood grades, tank cars, $5.65 to $5.75 f.o.b. southern shipping point.

Salt Cake

Supply ample, Demand good. Domestic quoted at $22.00/$24.00, f.o.b. shipping point, freight allowed to destination.

Soda Ash

Demand improved; supply adequate. Current prices, car lots per 100 pounds; light ash in bulk, $1.00; in paper bags, $1.25.

Starch, Corn

Demand strong. Supply ample. Prices guaranteed against rises to Nov. 30. Pearl grade currently quoted at $4.72 per 100 pounds; powdered starch at $4.83 per 100 pounds; white corn dextrine at $5.99 per 100 pounds; car lots, f.o.b. Chicago.

Starch, Potato

Heavy paper and textile demand. Supply tightened by crop conditions. Prices nominal. Idaho high grade quoted at $7.25 cwt. l.c.l., ex N. Y. whse. New production quoted at $5.25 cwt., car lots, f.o.b. shipping point. Maine production makes slow start on heavy order backlog. Quoted at $5.10 cwt. f.o.b. shipping point.

Sulphate of Alumina

Demand steady. Prices firm. Supply good. The commercial grades are quoted from $1.50 per 100 pounds, in bags, car lots, f.o.b. works. Iron free is $2.75 per 100 pounds in bags, car lots, at works.

Sulphur

Supply ample. Demand sustained at good level. Prices firm. Annual contracts are quoted at $18 per long ton, f.o.b. mines; $19.50, f.o.b. vessels, Gulf ports. Export price f.o.b. Gulf ports is $22.00 per long ton.

Talc

Demand continues far ahead of supply. Prices steady. Domestic grades are currently quoted at $23 to $28 per ton in 50-lb. paper sacks, car lots, f.o.b. mills; Canadian at $35 and up per ton.

Tapioca Flour

Supply liberal. Fair demand. Dextrinizable grades range from $9.00/$9.90 cwt. for superior high grades to $8.25/$8.75 cwt. for high-, on dock Atlantic and Gulf ports. Medium grades range from $7.00/$7.50 cwt. on dock, N. Y., and are tight in supply, prices firm.

Titanium Dioxide

Demand strong. Prices firm. Output threatened by steel strike. Anastase 19½c pound carload lots, 20c l.c.l., rutile, 21½c pound carload lots, 22½c l.c.l.; 50-pound bags, f.o.b. plant, actual freight allowed.

IMPORTS — EXPORTS

France Lifts OEEC Quotas

NEW YORK—France has lifted its quotas on 20 percent of the goods imported from countries in the Organization for European Economic Cooperation and their possessions. These goods include certain cereals, chemical products, dyes, minerals, leathers and skins, textiles, tools, non-ferrous metals and wood pulp, the Salesmen's Assn. of the Paper Industry reports.

Canadian Imports-Exports

OTTAWA — Imports of paper into Canada advanced to $1,477,000 during August as compared with $1,284,000 in August a year ago and reached a total of $13,037,000 in the first eight months of this year as against $11,588,000 last year in the corresponding period, the Canadian Government reports.

Exports of newsprint paper rose to $40,786,000 during August this year compared with $31,832,000 a year ago and other paper dropped to $1,334,000

Table 4

Exports of Heavy Paper Shipping Sacks and Paper Bags from the United States, by Country of Destination, 1938[1] and 1946-48
[Quantity in pounds; value in dollars]

Country of destination	1938[1] total		1946					
			Heavy paper shipping sacks		Paper bags, other		Total	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Union of South Africa	150,512	30,157	580,183	68,547	1,217,356	408,770	1,797,539	477,317
Philippines	2,282,038	155,670	1,219,741	142,105	605,153	76,504	1,824,894	218,609
Korea	.....	.....	.....	.....	.....	.....	.....	.....
Cuba	1,352,702	90,690	514,468	52,846	978,919	287,894	1,493,387	340,740
Venezuela	67,336	6,622	543,220	51,975	133,029	42,815	676,249	94,790
Japan	1,591	131	.....	.....	.....	.....	.....	.....
Canada	3,364,034	221,419	5,451,243	445,554	2,028,536	260,335	7,479,779	705,889
China	10,083	537	485,241	41,702	79,290	14,525	564,531	56,227
Dominican Republic	653,091	36,837	468,802	44,065	468,759	58,664	937,561	102,729
French Indochina	.....	.....	447,251	41,310	.....	.....	447,251	41,310
Total	7,881,387	542,063	9,710,149	888,104	5,511,042	1,149,507	15,221,191	2,037,611
Others	6,979,480	402,522	8,999,745	781,674	5,972,576	727,771	14,972,321	1,509,445
Grand total	14,860,867	944,585	18,709,894	1,669,778	11,483,618	1,877,278	30,193,512	3,547,056

Country of destination	1947						1948					
	Heavy paper shipping sacks		Paper bags, other		Total		Heavy paper shipping sacks		Paper bags, other		Total	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Union of So. Af.	11,512,223	1,261,731	5,048,958	1,123,887	16,561,181	2,385,618	12,765,878	2,022,562	2,275,489	779,233	15,041,367	2,801,795
Philippines	4,361,856	643,521	2,931,191	401,400	7,293,047	1,044,921	6,712,239	1,059,549	4,103,558	544,617	10,815,797	1,604,166
Korea	.....	.....	.....	.....	.....	.....	2,838,260	525,419	100,000	23,938	2,938,260	549,357
Cuba	971,805	125,049	1,226,008	413,692	2,197,813	538,741	759,288	102,988	771,121	361,411	1,530,409	464,399
Venezuela	1,491,161	173,858	384,544	88,735	1,875,705	262,593	2,494,658	339,889	375,152	105,475	2,869,810	445,364
Japan	.....	.....	.....	.....	.....	.....	2,833,848	430,513	.....	.....	2,833,848	430,513
Canada	5,600,223	580,490	1,147,662	191,159	6,747,885	771,649	2,785,620	337,788	225,443	59,865	3,011,063	397,653
China	3,347,265	415,919	60,250	8,473	3,407,515	424,392	2,522,596	379,080	.....	.....	2,522,596	379,080
Dom. Republic	88,736	8,336	412,944	49,988	501,680	58,324	1,342,205	168,174	1,030,048	144,440	2,372,253	312,614
French Indochina	659,789	74,709	.....	.....	659,789	74,709	1,709,404	235,623	.....	.....	1,709,404	235,623
Total	28,033,058	3,283,613	11,211,557	2,277,334	39,244,615	5,560,947	36,763,996	5,601,585	8,880,811	2,018,979	45,644,807	7,620,564
Others	14,887,809	1,273,218	8,048,590	1,146,257	22,936,399	2,419,475	8,887,962	1,128,301	4,913,253	781,552	13,801,215	1,909,853
Grand total	42,920,867	4,556,831	19,260,147	3,423,591	62,181,014	7,980,422	45,651,958	6,729,886	13,794,064	2,800,531	59,446,022	9,530,417

against $2,924,000 last year. In the first eight months of this year, such exports showed newsprint paper rising to a cumulative total of $277,500,000 compared with $241,014,000 last year, other paper falling down to $13,621,000 this year against $22,506,000 a year ago.

The official report also states that exports of pulpwood totaled $2,641,000 during August this year as compared with $3,958,000 last year in the same month and showed a cumulative total of $20,440,000 in the first eight months of this year as against $25,920,000 in the corresponding period a year ago.

U. S. Exports

WASHINGTON—The increased value of United States exports of heavy paper shipping sacks in 1948 more than offset a decrease in exports of other types of paper bags, including grocery, variety and specialty types, says the Department of Commerce in a report "U. S. Exports of Containers, 1948," this week.

As a result there was an overall increase of $1,549,995 in value of shipments, compared with 1947 figures on paper bag exports, the report indicated. Algeria and Korea, whose imports in previous years have been negligible, took almost $1,000,000 worth in 1948, and were largely responsible for rise, it was stated.

Exports of heavy paper shipping sacks and paper bags from the United

MEISEL MACHINERY IS HELPING IN ALL FIELDS

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Crown-Zellerbach Corporation
Crown-Zellerbach Corporation
Crown-Willamette Paper Company
Fairfield Paper Company
Great Northern Paper Company
Hoberg Paper Mills
International Paper Company
Southern Kraft Div.
National Container Corporation
Ohio Boxboard Company
Puget Sound Pulp and Timber Company
Rhinelander Paper Company
Riegel Paper Corporation
Thilmany Pulp and Paper Company
Weyerhaeuser Timber Company

WITH

Long-standing preference by pulp and paper mills for the Stirling boiler continues unabated, as evidenced by provision, in post-war years, of Stirling steam capacity in excess of 2½ million pounds per hour for companies listed on this page. These new units span a capacity range of 30,000 to 150,000 pounds per hour at temperatures up to 800 F and pressures to 725 psi.

Adaptable to a wide variety of furnace types with any degree of water-cooling, and to any fuel and firing method, the Stirling boiler reliably delivers clean, dry steam—even with relatively high boiler water concentrations...readily responds to sudden and heavy load swings. These are some of the reasons why Stirling boilers have been a heavy favorite for 61 years with users of power, heating, and process steam...reasons why continued preference is shown for the modern versions of this service-proved design. A complete account of the Stirling's many advantages is contained in Bulletin G-62. Write The Babcock & Wilcox Co., 85 Liberty St., New York 6, N. Y.

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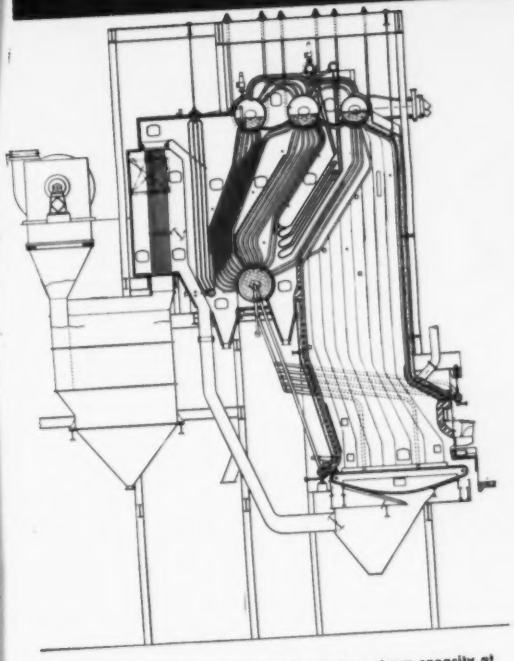
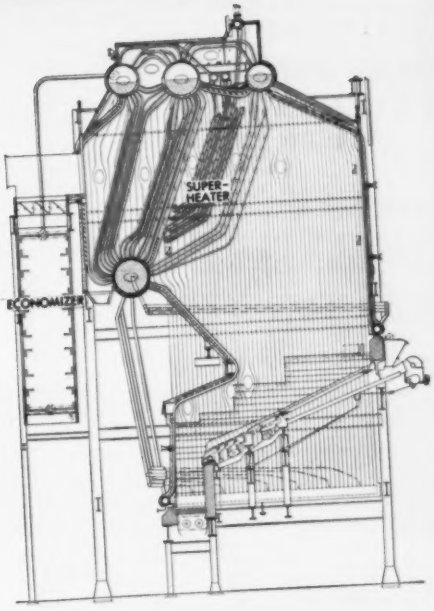
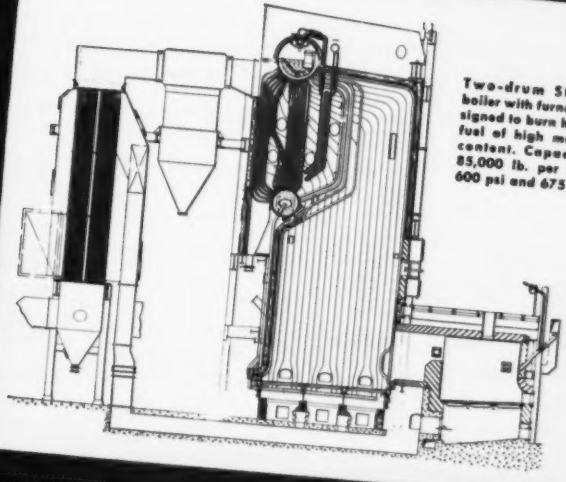


Bark-fired Stirling boiler of 85,400 lb. per hour steam capacity at 650 psi and 700 F. Arranged for future coal-firing.



Underfeed stoker-fired Stirling boiler with steam capacity of 150,000 lb. per hr. at 925 psi and 825 F.



Two-drum Stirling boiler with furnace designed to burn hogged fuel of high moisture content. Capacity is 85,000 lb. per hr. at 600 psi and 675 F.

B&W

BABCOCK & WILCOX

Table 5

Exports of Heavy Corrugated and Solid Fiber Shipping Containers and Paper Boxes and Cartons, n.e.s., From the United States, by Country of Destination, 1938 and 1946-48

[Quantity in pounds; value in dollars]

Country of destination	1938[1] total		1946					
			Corrugated and solid fiber shipping containers		Paper boxes and cartons, n.e.s.		Total	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Philippines	1,849,513	57,769	1,045,355	102,456	137,781	35,797	1,183,136	138,253
Canada	5,619,760	368,654	3,639,179	332,957	3,250,492	647,977	6,889,671	980,934
New Zealand	16,311	1,861	100	100	250	252	350	352
Venezuela	880,033	65,289	666,429	53,611	296,946	75,139	963,375	128,750
Mexico	109,715	15,906	4,315,619	319,167	1,302,506	203,933	5,618,125	523,100
Cuba	200,862	14,643	1,075,100	114,923	228,191	48,966	1,303,291	163,889
Newfoundland	135,207	12,296	40,427	3,638	182,100	25,894	222,527	29,532
Union of South Africa	227,123	27,905	48,862	4,036	165,751	74,359	214,613	78,395
Dominican Republic	180,554	11,674	215,313	20,881	206,590	19,907	421,903	40,788
Canal Zone	159,524	13,786	51,256	4,068	673,987	114,966	725,243	119,034
Total	9,378,602	589,783	11,097,640	955,837	6,444,594	1,247,190	17,542,234	2,203,027
Others	5,590,973	323,051	4,434,942	332,641	2,453,483	418,198	6,888,425	750,839
Grand total	14,969,575	912,834	15,532,582	1,288,478	8,898,077	1,665,388	24,430,659	2,953,866

Country of destination	1947						1948					
	Corrugated and solid fiber shipping containers		Paper boxes and cartons, n.e.s.		Total		Corrugated and solid fiber shipping containers		Paper boxes and cartons, n.e.s.		Total	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Philippines	4,413,696	372,849	1,632,857	298,483	6,046,553	671,332	5,102,028	418,397	1,916,403	304,685	7,018,431	723,082
Canada	2,459,138	310,118	3,787,549	760,666	6,246,687	1,070,784	1,307,777	184,605	2,070,895	479,081	3,578,672	663,686
New Zealand	2,885,152	454,029	81	7	2,885,233	454,036	2,561,920	493,520	741,975	87,798	3,303,895	581,318
Venezuela	1,168,884	126,079	520,519	140,746	1,689,403	266,825	1,533,607	167,893	658,166	182,570	2,191,773	350,463
Mexico	2,026,369	157,016	2,555,635	340,976	4,582,004	497,992	2,149,135	192,800	782,285	130,795	2,931,420	323,595
Cuba	408,046	68,488	455,605	144,263	863,651	212,751	887,337	91,493	720,429	160,485	1,607,766	251,978
Newfoundland	118,848	11,438	343,620	56,828	462,468	68,266	374,691	54,815	634,525	88,611	1,009,216	143,426
Un. of S. Af.	251,414	27,607	350,083	166,913	601,497	194,520	153,943	27,325	289,453	115,892	443,396	143,217
Dom. Republic	265,377	40,169	228,351	28,904	493,728	69,073	344,389	34,212	197,076	49,545	541,465	83,757
Canal Zone	83,461	12,508	566,363	100,814	649,824	113,322	285,621	35,500	262,857	45,592	548,478	81,092
Total	14,080,385	1,580,301	10,440,663	2,038,600	24,521,048	3,618,901	14,900,448	1,700,560	8,274,064	1,645,054	23,174,512	3,345,614
Others	5,015,683	598,201	3,532,747	710,262	8,548,430	1,408,463	3,159,179	372,172	2,123,711	456,785	5,282,890	828,957
Grand total	19,096,068	2,178,502	13,973,410	2,748,862	33,069,478	4,927,364	18,059,627	2,072,732	10,397,775	2,101,839	28,457,402	4,174,571

[1] Not broken down by type.

States are shown in Table 4.

Exports of corrugated and solid fiber shipping containers are shown in Table 5, with paper boxes and cartons accounting for approximately 86 percent of the $752,793 decline reported for 1948.

The report pointed out that this country's exports of all types of containers, not including textile containers, while declining about 13 percent from the all-time record of 1947, still remained some 400 percent above the level of exports in 1938, the last "normal" pre-war year.

Operating against 1948 shipments in comparison with 1947, said the report, were the diminishing dollar resources of importing countries, availability in some foreign countries of formerly scarce materials, and resumption of foreign competition.

For instance, some countries are now able to obtain formerly scarce raw materials such as soda, and paperboard. With resumption of production in those countries, there was not only the expected loss of demand for United States containers within those areas, but also in neighboring countries owing to the renewal of foreign competition.

The only three groups of container exports to show gains in 1948 were heavy paper shipping sacks, tins and bottles, and container closures.

* * *

IMPORTS AT NEW YORK

Week Ending Nov. 12

Newsprint

H. C. Craig Co., Donpaco, Donnacona, 331 rolls.
N. Y. Herald Tribune, Markland, Liverpool, N. S., 1727 rolls.
N. Y. Journal American, Markland, Liverpool, N. S., 601 rolls.
Herald Statesman, Inc., Markland, Liverpool, N. S., 43 rolls.
Price & Pierce, Ltd., Markland, Liverpool, N. S., 1 roll.
Washington Post, (Alexandria, Va.), Markland, Liverpool, N. S., 2344 rolls.
Alexandria Gazette, (Alexandria, Va.), Markland, Liverpool, N. S., 59 rolls.
R. A. Olsen, G. D. D., Donnacona, 376 rolls.

Wallpaper

C. A. Haynes & Co., Media, Liverpool, 51 cs.
Hudson Shipping Co., American Importer, Havre, 1 cs.

Tissue Paper

B. F. Drakenfeld & Co., Media, Liverpool, 64 cs., 8 cs. (pottery).
Swan Mill Inc., American Miller, Hamburg, 2 cs.

Gummed Paper

B. F. Drakenfeld & Co., Media, Liverpool, 16 cs.

Parchment

Intermaritime Forwarding Co., Queen Elizabeth, Southampton, 1 cs.

Baryt Paper

R. Wilson Paper Corp., American Importer, Bremen, 13 cs.
F. C. Strype, American Importer, Bremen, 6 cs.
W. Reimerdes, American Importer, Bremen, 1 cs.

Printing Paper

Blue Cross Shipping Co., American Importer, London, 25 bls. 5 cs.
Acme Litho Plate Graining Co., Concordia, Hamburg, 50 cs.

Filter Paper

H. Reeve Angel & Co. Inc., American Importer, London, 14 cs.

Writing Paper

H. W. Robinson & Co., American Importer, London, 2 cs. (& envelopes).
Metasco Inc., Ronda, Havre, 2 cs.

Drawing Paper

H. Reeve Angel & Co. Inc., American Importer, London, 3 cs.

Raw Base Paper

Karr Ellis Co., American Importer, London, 1 cs.

Glazed Paper

Tice & Lynch, American Importer, London, 1 cs.

Wrapping Paper

Gutman & Co., American Miller, Bremen, 1 pcl.

Rags, Baggings, etc.

(———), Media, Liverpool, 64 bls. old woolen rags, 4 bls. woolen waste, 14 bls. old rags.

American Express Co., Media, Liverpool, 40 bls. new wool rags, 9 bls. rags.

E. Butterworth & Co. Inc., Media, Liverpool, 62 bls. old bagging.

Guaranty Trust Co., American Banker, Bordeaux, 115 bls. old rags.

Manufacturers Trust Co., Samuel Bakke, Naples, 61 bls. old bagging.

Lush Cotton Products Co., Explorer, Colombo, 200 bls. cotton waste.

New England Waste Co., Explorer, Colombo, 200 bls. cotton waste.

E. J. Keller Co. Inc., Fort Cadotte, London, 56 bls. mixed hessian bagging.

(———), American Importer, London, 50 bls. old jute bagging, 52 bls. rags.

J. Eisenberg, American Importer, London, 192 bls. old jute rags.

Castle & Overton, Inc., American Importer, London, 66 bls. bagging.

National City Bank, American Importer, London, 53 bls. old sisal strings.

Levinson & Basch, Concordia, Rotterdam, 221 bls. rags.

Midwest Waste Materials Co., Concordia, Bremen, 305 bls. old coal bags.

Midwest Waste Materials Co., Concordia, Antwerp, 79 bls. scrap bagging.

S. Godfrey, Agwistar, Vera Cruz, 5 bls. wool rags.

Brown Bros. Harriman Co., Hoegh Merchant, Bombay, 297 bls. cotton waste.

S. H. Waldstein, Hoegh Merchant, Bombay, 400 bls. cotton waste.

National City Bank, Reinholt, Kobe, 100 bls. waste bagging.

Southern Waste Co., Mormachawk, Buenos Aires, 93 bls. rags.

Dorf & Co., Mahenge, Antwerp, 95 bls. rags.

National City Bank, Ida Bakke, Genoa, 81 bls. old waste bagging.

Guaranty Trust Co., Ronda, Havre, 100 bls. old rags.

A. de Vriees Trading Corp., Ronda, Rouen, 53 bls. scrap bagging.

Chase National Bank, Ronda, Rouen, 63 bls. woolen rags.

Old Rope

(———), Explorer, Calcutta, 372 bls. old hemp rope cuttings.

Gluestock

Karr Ellis Co., Media, Liverpool, 287 bls.

Casein

(———), American Banker, Bordeaux, 2 bags.

Woodpulp

Price & Pierce, Ltd., Ranenfjord, Oslo, 500 bls. dry woodpulp.

Gottesman & Co., S/S Hoyanger, Portland, 3,000 bls. unbleached sulphite pulp, 6,000 bls. unbleached kraft pulp.

IMPORTS AT BALTIMORE

Week Ending Nov. 12

Burnett Foreign Trading Co., Ronda, Rouen, 44 bls. cotton waste.

IMPORTS AT NORFOLK

Week Ending Nov. 12

New England Waste Co., Explorer, Cochin, 100 bls. cotton waste.

IMPORTS AT WILMINGTON

Week Ending Nov. 12

Scott Paper Co., Esther Thorden, Sheet Harbor, Nova Scotia, 3,000 tons of woodpulp

IMPORTS AT ALBANY

Week Ending Nov. 12

Castle & Overton, Inc., Ranenfjord, Oslo, 8000 bls. dry bleached sulphite pulp.

The Borregaard Co., Inc., Ranenfjord, Oslo, 609 bls. airdry kraft special woodpulp, 250 bls. dry bleached sulphite pulp.

Price & Pierce, Ltd., Ranenfjord, Oslo, 2500 bls. dry bleached sulphite pulp.

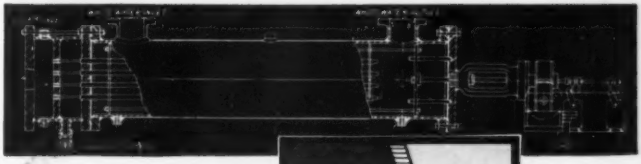
Castle & Overton, Inc., Ranenfjord, Drammen, 2000 bls. prime dry bleached sulphite pulp.

AT LAST IT'S HERE!

.....CONTINUOUS WHITE WATER HEATING WITH NO SHUTDOWNS FOR CLEANING.....

Paracoil Automatic SELF CLEANING WHITE WATER HEATER

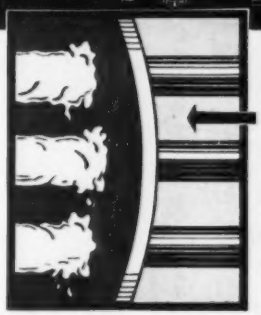
Specially Designed for the Paper Industry



HOW IT WORKS

The transverse heater baffles, which also serve as tube surface cleaners, are connected by tie rods to the yoke plate, which in turn is connected to the drive mechanism at the right. The time controls close the motor circuit at predetermined intervals. The yoke plate moves each baffle longitudinally along the tubes, until the drive mechanism reverses the action and returns the baffles to their original position.

Available in models for either manual, electric motor or hydraulic piston drive. Automatic types operate on adjustable predetermined time schedules.



BAFFLES MOVE FORWARD AND BACKWARD LEAVING TUBES CLEAN AS A WHISTLE

Patent No. 1826747
Other Patents Applied For

A BATCH OF MANUAL TYPE SELF CLEANING HEAT EXCHANGERS READY FOR SHIPMENT.

Every Inch of Every Tube Is Thoroughly Cleaned At Every Cycle!
100% Heater Capacity Available At All Times!
Standby Heating Equipment No Longer Needed!
Old Style Heater Cleaning Costs Forever Banished!

DAVIS ENGINEERING CORPORATION
1064 East Grand Street
Elizabeth 4, New Jersey
30 Rockefeller Plaza, New York 20

IMPORTS AT PORTLAND

Week Ending Nov. 12

Castle & Overton, Inc., Ranenfjord, Tofte, 5000 bls. dry bleached sulphite pulp.

The Borregaard Co. Inc., Ranenfjord, Tofte, 500 bls. dry bleached sulphite pulp.

TRAFFIC

Official Motor Frt. Classification 4

By EDWIN CHESTER HASTINGS

Official Motor Freight Classification # 4 governs shipments handled by participating carriers associated with the Eastern Motor Freight Conference. This tariff, and Coordinated Motor Freight Classification # 5, issued by the New England Motor Rate Bureau, are used by most carriers in the New England states.

To the first tariff, OMFC # 4, Supplement 24 will be effective November 26. The ratings only apply when the shipper meets the requirements of the following *new items.* Higher ratings will result if the classification instructions are ignored:

Item 37453 — Printed Matter, Paper or Paperboard, lithographed or printed, including Greeting Cards, in sheets, on skids, exceeding 44 inches in width. The rating is Class 3 and this is 70 percent of the first class rate.

Item 37454 — Printed Matter, Paper or Paperboard, lithographed, including Greeting Cards, UNCUT, *in sheets, in boxes or on skids. Maximum width of skid including paper thereon not to exceed 44 inches.* The rating is Class 5 and this is 35 percent of the first class rate.

If skids are used to support the lading *(and they are required to secure the lowest rating),* the "packing requirements" of Rule 5 instruct they "Must be constructed of material of sufficient strength and dimensions to afford convenient and safe handling. Articles must be securely tied, strapped, or bolted to skids."

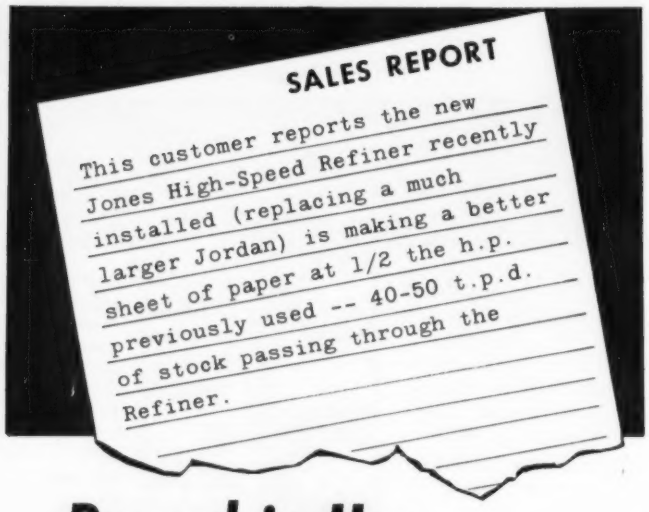
To the second tariff, CMFC # 5, Supplement 7 was effective November 16 and new items are provided with ratings on Plastic Materials or Products. These include laminated gums or resins, or gums or resins combined with macerated paper, fibre or cloth, and hardened or set by means of heat or pressure. Ratings depend upon how the articles are shipped. If they move in barrels or boxes, flat or folded flat, nested solid, the rating Class 3 (70 percent) applies. If shipped otherwise, they are subject to Rule 28 and the rating is dependent upon cubic foot space used. Rule 28 instructs: *"When an article is classified according to pounds per cubic foot per package, shipper must show on bill of lading weight in pounds per cubic foot as tendered for transportation, and if density is not shown, article will be subject to the highest rating provided for the article."*

The article shipped with less than six pounds per cubic foot is rated Class 1 (100 percent); over six but less than ten pounds per cubic foot, Class 2 (85 percent); ten pounds and over per cubic foot, Class 3 (70 percent).

When this item is shipped as Scrap in barrels, boxes or drums, effective with the date of Supplement 7 (November 16), the lading is subject to Rule 28. The ratings are: Under 15 pounds per cubic foot, Class 3 (70 percent); over 15 but less than 20 pounds per cubic foot, Class 4 (50-55 percent); over 20 pounds per cubic foot, Class 5 (35 percent).

Most of the motor carriers participating in CMF Classification # 5 accept these ratings. There is, however, one motor carrier operating in the New England area which will *not* honor the above ratings. In Supplement 2, effective November 15, (new item) # 943, page 5, Exceptions to Ratings of CMFC # 5, the rating on Plastic Articles, noibn, shipped in barrels or boxes, will be charged the *first class rate* (100 percent) from Farnumsville, Mass., to points on the line of the carrier (Emmott-Valley Transportation Co., Uxbridge, Mass.).

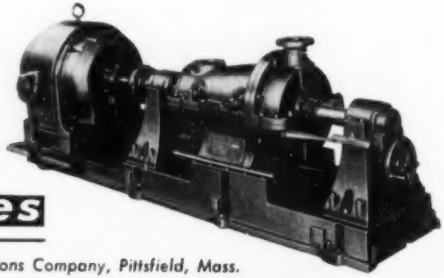
The New England Motor Rate Bureau's Tariff 22-A, effective November 10, covers "Special Service Rates and Charges" between points in Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island and Ver-


SALES REPORT
This customer reports the new Jones High-Speed Refiner recently installed (replacing a much larger Jordan) is making a better sheet of paper at 1/2 the h.p. previously used -- 40-50 t.p.d. of stock passing through the Refiner.

Proved in Use

We've deleted the customer's name: otherwise this is just what the salesman reported. And it is backed up by many similar experiences that prove the Jones High-Speed Refiner is producing results like this, not once but many

It can produce them for you. Write for Bulletin EDJ-1011A, or tell us your problem and we'll give you full details.



E. D. Jones & Sons Company, Pittsfield, Mass.

BUILDERS OF QUALITY STOCK PREPARATION MACHINERY

mont. The area also includes from these New England states to New York and New Jersey.

The tariff governs under the term "Special Service," where the shipper requires exclusive and/or expedited vehicle services, that is, the use of truck, tractor, trailer, to move at the time and under conditions set forth by the shipper or consignee. The tariff has an important condition, that "the use of rates may only be used with shipper's or consignee's authorization." The rates are based on mileages shown in the Tariff of Highway Mileages. Charges are computed on loaded miles only, that is, mileage from point of origin to point of destination. The mileage figured by the shipper may not always agree with that used by the carrier. The carrier is to use the shortest route as shown in his Certificate of Operations. The tariff allows compulsory diversion from the shortest route *"Where size or weight of load requires authority or express permission from State or Local authorities charged by law with regulating the operation of motor trucks which exceed the weight or dimensional limits legal in such jurisdiction, and such operations under the terms and conditions expressly named by such authorities necessitate additional mileage in the transportation of the load, the freight charges shall be assessed on the basis of mileage computed via the route required by State permit as provided for in Tariff of Highway Mileages. Route required by State or Local permit must be shown on freight bill."*

If there is a charge made for these permits, they are to be separately listed on the freight bill.

Special Service Rates do not include Bridge Tolls, they are to be collected from the firm paying freight charges.

Delays in loading and unloading can be expensive. A delay is the time consumed in excess of the free time allowed, for example, to load and/or unload freight, charges are computed on the following basis:

Vehicle Capacity	Maximum free time allowed (in minutes)	Charge per hour for delay in excess of free time
Not over 5 tons	75	$3.23
Over 5 tons but not over 8 tons	110	3.29
Over 8 tons but not over 12 tons	135	3.48
12 tons or over	135	3.86

The tariff makes a radical departure from the usual custom, that is, there are *Weekday rates* and *Sunday or Holiday rates.*

Important point from this tariff that should be noted to avert excessive charges: Motor carrier is to furnish vehicle having lowest rated capacity that can lawfully transport shipment. However, if carrier does not have available such vehicle and furnishes larger unit, the applicable charge shall be for that type equipment that could lawfully transport shipment.

Seek Freight Overcharge Rebates

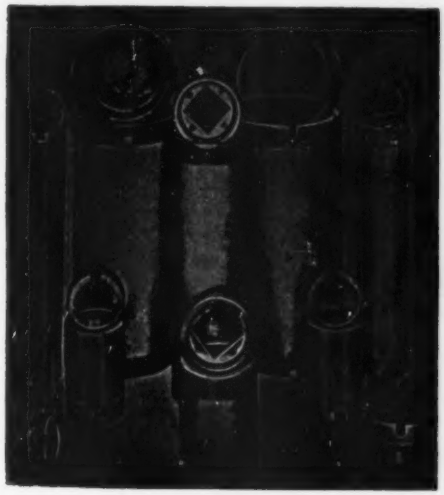
OTTAWA — The Canadian railways should be made to repay shippers for overcharges on freight tolls, the Royal Commission on Transportation was told on November 8. The Canadian Pulp & Paper Ass'n., called for a system of rebates on overcharges such as in effect in the United States. Canada has no method of rebating surcharges on freight.

Newsprint Barged to Nashville

NASHVILLE, Tenn. — The Nashville Publishing Co., publishing agents for the *Banner* and *Tennessean*, last month received a river shipment of 1,600 tons of newsprint, moving by all-water routes from Newfoundland to the Cumberland River port. The barge, 248 x 40 ft., was said to be the largest ever to be towed up the Cumberland River. It was loaded only to half capacity due to lack of greater channel depth (8 ft.) in the river.

ICC Docket 29847 Compliance

The rail carriers have complied with the order of the Interstate Commerce Commission's Docket # 29847 to provide specific commodity rates on liquid glue and synthetic resins. The rates are in Agent L. E. Kipp's Trans-continental Freight Bureau West-Bound Tariff No. 4-W, Items 1428½ and



ELIXMAN
CORES
CAPS

Straight wound paper cores made in sizes from 2" to 10" inside diameter with any thickness wall required.

Long draw protected slot caps of heavy gauge steel in all standard sizes.

Heavy duty caps with reenforced square hole. This patented feature of reenforcement gives added strength and durability.

Samples of caps or cores will be gladly submitted

ELIXMAN PAPER CORE COMPANY, INC.
CORINTH, N. Y.

1760, Supplement 169, effective November 23, 1949.

The rates apply on the articles when shipped in privately-owned tank cars. Minimum weight is 50,000 pounds. The rate on glue is 183c per 100 pounds; on resins, 194c per hundred pounds. These rates are not subject to the tariffs of increased rates. They apply from Ferndale (Royal Oak), Mich., to Aberdeen, McCleary, Shelton, and Seattle, all in the state of Washington.

The requirements "privately-owned tank cars" and "50,000 pounds" are exceptions to the tariff's Item 794: *"Rates provided for freight in tank cars do not obligate the carriers to furnish tank cars." "Minimum weight not less than 36,000 pounds."*

Freight charges on shipments in tank cars are computed differently than other freight. To find the weight one must know the number of gallons in the tank and also in the dome or shell. These two figures are added together to find the total gallons. If the carrier's tariff provides an estimated weight for a gallon of the commodity, this can be used. Where this is not provided, the shipper must certify on the bill-of-lading the actual weight per gallon of the commodity when loaded. The weight of the gallon times the number of gallons in the tank and shell will give the correct total weight in the car. The total weight is the basis then to apply the rate per hundred pounds. The last step, that of adding the three percent transportation tax, will give a clear idea of the actual charges due the carrier.

Mississippi River Barge Season Dates

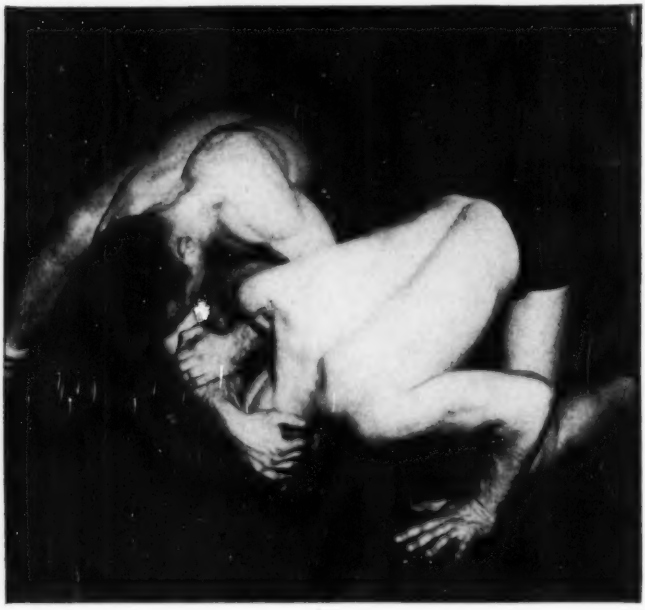
The information in the accompanying tabulation concerns those in the paper industry who use barge transportation. The navigation season for 1949 will close this month for river shipments moving *north of St. Louis, Mo., and E. St. Louis, Ill.* The Federal Barge Lines will not accept freight on or subsequent to the closing dates shown.

Shipments in transit that were booked to move all or partly by barge can be diverted to other means of transportation.

To save delays in transit, a wire to re-route should be sent to carrier handling movement from origin to destination.

FEDERAL BARGE LINES
Closing Dates, Navigation, for River Shipments Moving North of St. Louis, Mo., and East St. Louis, Ill.

From (when originating locally or when from beyond)	*To* (When destined locally or when for beyond)	Closing Date Nov.
MINNESOTA		
Minneapolis	Dubuque, Iowa	19
"	Clinton, Iowa	"
"	Burlington, Iowa	"
"	Rock Island, Ill.	"
"	E. St. Louis, Ill.	"
"	St. Louis, Mo.	"
St. Paul,	(same as above)	20
IOWA		
Dubuque	Minneapolis, Minn.	19
"	Clinton, Iowa	22
"	Burlington, Iowa	"
"	Rock Island, Ill.	"
"	E. St. Louis, Ill.	"
"	St. Louis, Mo.	"
"	St. Paul, Minn.	19
Clinton	Minneapolis, Minn.	17
"	St. Paul, Minn.	17
"	Rock Island, Ill.	22
"	Burlington, Iowa	"
"	E. St. Louis, Ill.	"
"	St. Louis, Mo.	"
"	Dubuque, Iowa	17
Burlington	Minneapolis, Minn.	16
"	St. Paul, Minn.	"
"	Dubuque, Iowa	"
"	Clinton, Iowa	"
"	Rock Island, Ill.	"
"	E. St. Louis, Ill.	24
"	St. Louis, Mo.	"
ILLINOIS		
Rock Island	Minneapolis, Minn.	17
"	St. Paul, Minn.	"
"	Dubuque, Iowa	"
"	Clinton, Iowa	"
"	Burlington, Iowa	23
"	E. St. Louis, Ill.	"
"	St. Louis, Mo.	"
St. Louis, Mo. and E. St. Louis, Ill.	Minneapolis, Minn.	14
"	St. Paul, Minn.	"
"	Dubuque, Iowa	"
"	Clinton, Iowa	"
"	Burlington Iowa	"
"	Rock Island, Ill.	"



Don't wrestle with your Felt problems.
Use *DRAPER FELTS.*

The DRAPER Felt

DRAPER BROTHERS COMPANY
Woolen Manufacturers Since 1856
CANTON, MASSACHUSETTS
RALPH E. BRIGGS, *Sales Manager*

● BRADFORD WEST, *Pittsfield, Mass.* ● WILLIAM N. CONNOR, *Jr., Canton, Mass.* ● L. H. BREYFOGLE, *Kalamazoo, Mich.* ● ● WALTER A. SALMONSON, *2514 Northeast 59th Ave., Portland, Oregon* ● L. L. GRIFFITHS, *Jr., Kalamazoo, Mich.* ● ● HAROLD H. FISH, *Syracuse, N. Y.* ●

OBITUARIES . . . .

R. Franklin McElwain, 84, retired vice-president and general manager of both the Crocker-McElwain Co., and the Chemical Paper Mfg., Co., Holyoke, Mass., died at his home in South Hadley, Mass., on November 6. Surviving him are his widow, Mrs. Rosamond McElwain; two daughters, Mrs. Yngve Olsen, and Mrs. A. Sumner Crane; two sons, Franklin R. and Bruce; and a brother, Dwight McElwain.

Winfred Winslow Crosier, 71, retired superintendent of the American Pad & Paper Co., Holyoke, Mass., died at his home in that city on November 5. Surviving him are a daughter, Miss Mildred L. Crosier; and three brothers, Charles H., Watson A., and George R. Crosier.

Edwin F. Bearce, 67, vice-president of the Chillicothe Paper Co., Chillicothe, Ohio, died on November 11. Surviving Mr. Bearce are his widow, Mrs. Mary Ida (Fellows) Bearce; and two brothers, Winfield D., and George Dunham Bearce.

Alfred A. Hitchcock, vice-president and general manager of the J. B. Pearce Co., Cleveland, died in Glens Falls Hospital, Glens Falls, N. Y., on November 3. Surviving him are his widow, Mrs. Bertha Carpenter Hitchcock, and a brother, George P. Hitchcock.

H. E. (Ed) Van Wey, 71, retired employe of the Crown-Willamette Paper Co., West Lynn, Ore., died in Oregon City hospital, Oregon City, Ore., on November 5. Surviving him are his widow, Mrs. Bessie Van Wey; and a daughter, Mrs. H. K. Coffey.

John O. Morgan, 55, retired general superintendent of the High Point Paper Box Co., High Point, N. C., died at his home near that city on November 7. Surviving are his widow, two daughters and five sons.

Alfred L. Kronquest, former manager of the experimental department of the Continental Can Co., Syracuse, N. Y., died at his home in Bronxville, N. Y., on November 4. His widow and a son survive.

Daniel Scherer, 48, Cleveland factory representative for the Sandusky Folding Box Corp., died on November 8 of a heart attack. His widow, a son and a daughter survive.

John Alexander Brunette, 74, on the staff of J. R. Booth Co., for many years, died recently in Ottawa after a lengthy illness. He is survived by one daughter.

AMERICAN PAPER AND PULP ASSOCIATION'S PRODUCTION RATIO REPORT*

(Production as per cent of six-day capacity)

COMPARATIVE WEEKLY SUMMARIES

Current Weeks—1949		Corresponding Weeks—1948	
Oct. 1	97.2	Oct. 2	98.6
Oct. 8	96.6	Oct. 9	98.4
Oct. 15	97.9	Oct. 16	99.9
Oct. 22	99.0	Oct. 23	98.7
Oct. 29 (Revised)	98.5	Oct. 30	99.3
Nov. 5	99.0	Nov. 6	98.1

COMPARATIVE MONTHLY SUMMARIES

1948						1949	
Jan.	100.1	May	100.5	Oct.	99.1	Jan.	94.6
Feb.	99.8	June	95.7	Nov.	97.1	Feb.	92.8
Mar.	100.8	July	85.3	Dec.	87.1	Mar.	89.1
Apr.	100.8	Aug.	96.8	Year Avg.	96.2	Apr.	85.1
		Sept.	91.8			May	‡82.7
						June	78.6
						July	72.8
						Aug.	‡88.0
						Sept.	‡90.3
						Oct.	‡98.0

‡ Preliminary.

COMPARATIVE YEARLY SUMMARIES

	1942	1943	1944	1945	1946	1947	1948	1949
Year to Date	91.9	88.4	88.5	89.3	101.3	101.3	97.1	87.6
Year Average	90.4	87.8	88.1	89.4	101.1	104.3	96.2	

PAPERBOARD OPERATING RATIOS†

Current Weeks—1949		Corresponding Weeks—1948	
Oct. 1	94	Oct. 2	96
Oct. 8	92	Oct. 9	96
Oct. 15	94	Oct. 16	97
Oct. 22	94	Oct. 23	95
Oct. 29	94	Oct. 30	96
Nov. 5	92+	Nov. 6	95

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1948	99	100	102	102	100	94	81	92	91	96	94	84	95
1949	88	85	79	79	78	75	64	86	87	94			

* All of the above data is based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separate tonnage figures are not readily available. Does not include mills producing newsprint exclusively.

† Per cents of operation based on "Inch-Hours" reported to the National Paperboard Association.

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Armour has it as close as your phone. Just call the nearest of Armour's 332 convenient stock points for all grades. Quick delivery keeps your inventories low.

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- We design, build, and equip paper and pulp mills ... steam generating plants ... and facilities for eliminating stream pollution.
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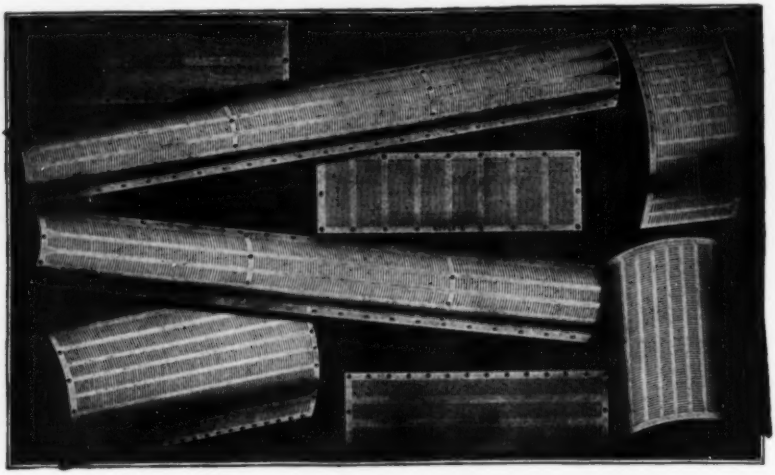

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—lower your operating costs
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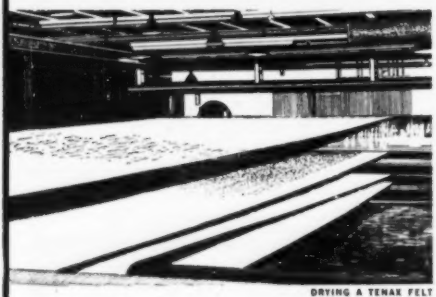

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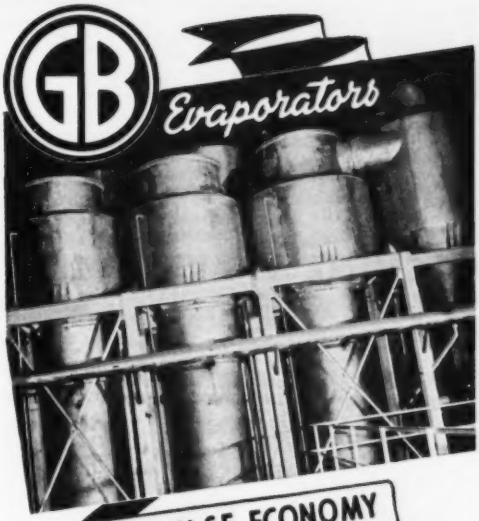

INCREASE ECONOMY
REDUCE EVAPORATION COSTS
REDUCE MAINTENANCE
REDUCE SALT CAKE LOSSES

Even with the mounting costs of fuel and labor, many mills have found that by replacing their obsolete evaporators with Goslin-Birmingham Long Tube Multi-Effect Black Liquor Evaporators, their overall evaporation costs have been considerably reduced. These savings are being used to amortize the cost of this new, modern equipment.

Such an installation is the G-B Sextuple Effect Evaporator at the Crown-Zellerbach Corporation's Port Townsend plant, one view of which is shown above.

If such a program of modernization is indicated in your plant, write, wire or call and have one of our engineers immediately available for consultation—without obligation. Literature is available on request.

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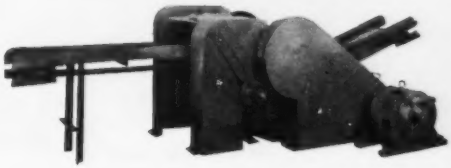
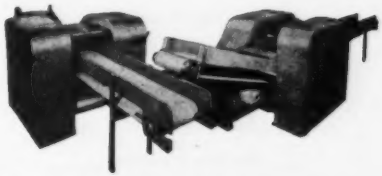
TAYLOR-STILES RAG CUTTERS

The size range of these efficient cutting machines—one ton to five tons an hour—provides for all capacity needs of paper manufacture.

TYPICAL TAYLOR-STILES CUTTERS ARE—



NO. 1 RAG CUTTER—Capacity, one ton an hour. This fine machine compares in every way with our big five-tons-an-hour cutters.



NO. 36 TANDEM RAG CUTTER—Cross cuts the rags for greater uniformity in the size of cuttings. Capacity one and one half tons an hour.

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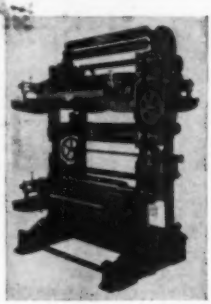

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Slitters and Rewinders for Vulcanized Fibre and Heavy Board

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Rotary Card Cutters

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IN 1926 an eastern board mill equipped its paper machine with Stickle Automatic Control and installed a Stickle Differential Drainage System. After ten years' experience with this equipment, the President and Treasurer of the company stated that "After installing Stickle Equipment we were able to increase production between 8 and 10 tons per day, as well as improve the quality of our board. We . . . can honestly say that its purchase was the best investment we ever made at our plant.

IN 1923 we purchased another board mill and immediately installed Stickle Automatic Control and a Stickle Differential Drainage and Boiler Return System" with equally satisfactory results.

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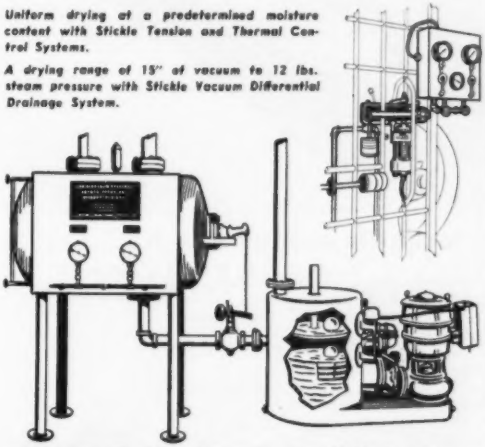
Uniform drying at a predetermined moisture content with Stickle Tension and Thermal Control Systems.

A drying range of 15" of vacuum to 12 lbs. steam pressure with Stickle Vacuum Differential Drainage System.



● Stickle Bulletin No. 160, "Stickle Steam Systems for Paper and Paper Board Mills," and auxiliary Bulletin No. 160-A, give information and data on Stickle Equipment, in use in paper and board mills throughout the States and Canada, providing manufacturers the advantages of increased production, improved product quality, and reduced operating costs. Mailed on request.

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MACHINE CALENDER STACKS

Lobdell Machine Calender Stacks virtually pay for themselves by effecting savings in maintenance and production . . . and they assure uniform paper finish, plus maximum output in minimum time. Lobdell Machine Calender Stacks —equipped with Lobdell-made Chilled Iron or "Puraloy" Rolls— are supplied with anti-friction, bronze or babbitted bearings. Pressure, to journals of top roll, is applied by an effective system of weights and levers. The lifting arrangement is controlled from the floor, operated by ratchets, electric motors or hydraulic cylinders. Write for detailed information.

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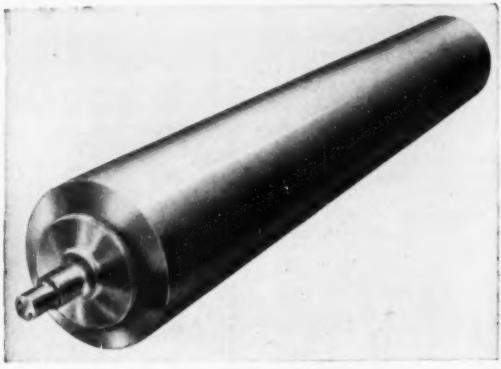

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PRODUCTION: Modern production facilities for large and small rolls of all types in metal, wood, and rubber covered.

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RECORD PAPER & PULP STOCK VALVES "BONNETLESS SELF CLEARING" - - - "RESIDUE POCKETLESS TYPE"

METALS — I.B.B.M., all iron, bronze or stainless steels, body parts plain or rubber lined.

The photo of 24" Fig. 241 I. B. B. M. valve while illustrating the gate bottom wedge system for forced gate seating and "GUILLOTINE" edge for shearing fibre at seat also shows the packing box and yoke as separate units. Both adjustable.

- The "FAST THREADED" screw stem and ball bearing speeds valve operation.
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"RECORD PRODUCTS EXTENSIVELY USED IN DEFENSE PROJECTS."

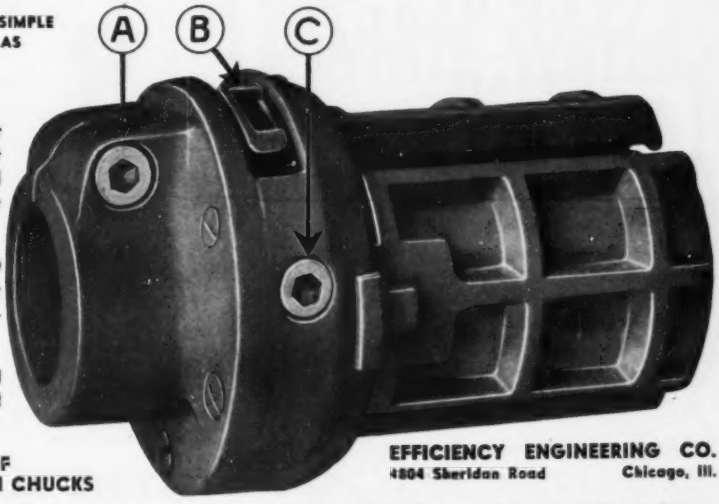
RECORD FOUNDRY & MACHINE COMPANY

LIVERMORE FALLS MAINE, U. S. A.

CHUCK PROBLEM SOLVED

APPLYING-EXPANSION-CHUCKS

AS SIMPLE AS



INSTRUCTIONS

A—TO LOCK CHUCK at proper position on shaft insert hex wrench and tighten down socket bolt **A** firmly.

B—TO LOCK ROLL TO SHAFT insert flat bar tool at **B** and pull upward firmly.

C—TO LOCK EXPANSION —insert hex wrench and tighten socket bolt **C**.

EFFICIENCY ENGINEERING CO.
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EXCLUSIVE FEATURES OF EFFICIENCY EXPANSION CHUCKS

1—Both shaft and core are positively locked together.
2—Perfect alignment is assured.
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5—Equally effective for returnable—non-returnable—or metal cores.
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BLEACHED SULPHITE PULP

for the manufacture of Cellophane, Rayon and Products of Paper.

RESTIGOUCHE COMPANY, LTD.
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Photo, Courtesy J. M. Huber Corporation

Single Instrument Measures Smoothness, Porosity and Softness of Paper

You just interchange the lower test plates in the GURLEY-HILL S-P-S Tester to convert it into an instrument for testing either smoothness, porosity or softness of any type of paper, by measuring a given air-leakage over or through the paper.

This 3 in 1 laboratory "assistant" is simple to operate, quick and accurate, and a real utility instrument where printing quality of paper must be reliably measured.

Bulletin No. 1400 describes the S-P-S Tester as well as other Gurley paper testing instruments. It's worth writing for today. W. & L. E. Gurley, 520 Fulton St., Troy, New York.

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Carbon blacks for all paper and board stocks—outstanding soft texture, particle fineness and jet black color. Takes well to the fiber, shows high retention.

Best for performance in the Beater and Jordan because of ease of wetting and ready dispersion in the furnish.

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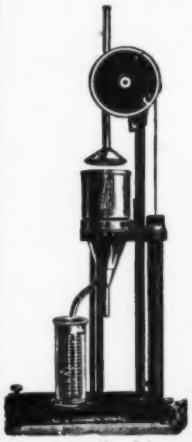

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Old inaccurate Scales, Micrometers and other testers recalibrated and made over like new.

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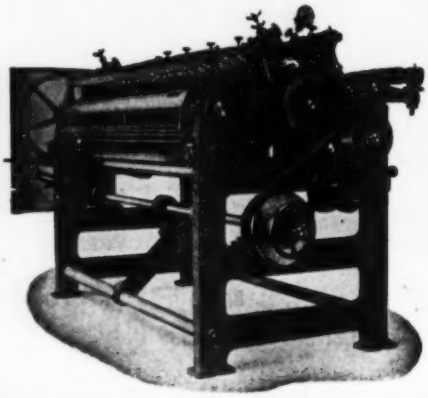

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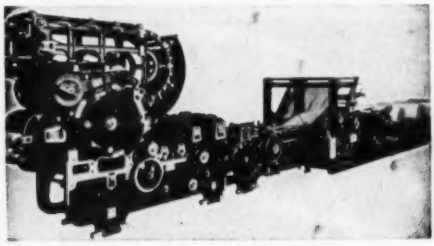
SINGLE, DUPLEX AND DIAGONAL PAPER CUTTERS
CUTTER KNIVES, PATENT TOP SLITTERS



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Write in requesting our bulletin describing the complete line of Weber machines.

H. G. WEBER & CO., INC.

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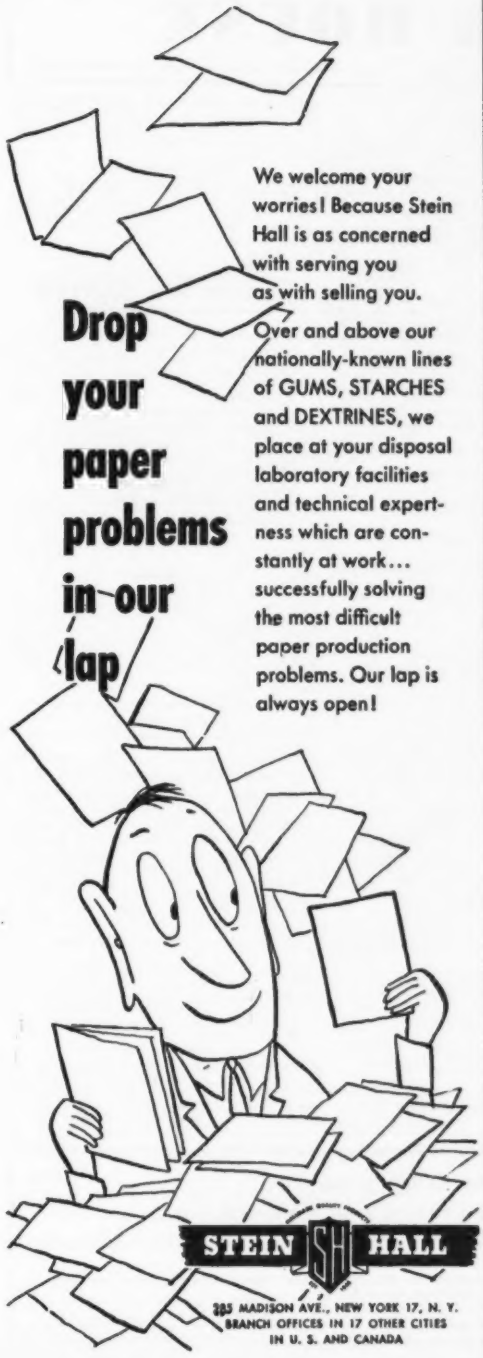
MEMBER, Packaging Machinery Manufacturers Institute.



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Make more paper and more profits with the PERMUTIT WHITE WATER RECLAIMER!

In *one compact operation* utilizing the sludge blanket principle developed by Permutit, the White Water Reclaimer recovers pulp, fiber, and filler . . . and enables you to use your process water over again!

By giving you more paper, better process water, and added profits . . . as well as by reducing unwanted stream pollution, the Permutit® White Water Reclaimer more than pays for itself!

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Resident salesmen wanted to represent large eastern mill manufacturing comprehensive line of toilet tissue, paper napkins, paper towels and many other specialty items that are sold in volume to paper jobbers, wholesale grocers and chain stores. Write giving all details regarding experience, salary requirements and other information that will be helpful in determining qualifications. Territories open in Pennsylvania, Indiana, Michigan, Illinois, Wisconsin, Iowa, Missouri and Kentucky. Write Box 49-518, care Paper Trade Journal. N-17

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SALARIED POSITIONS $3,500—$25,000

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TF

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MACHINE TENDER—Fully experienced on all folding grades. Good steady job with excellent opportunity in one machine mill. Address Box 49-517 care Paper Trade Journal. N-17

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Positions Open

Managers and superintendents for mills making folding box board, also wet machine board mill, pulp and paper manufacturing, bonds, envelope, mimeograph, writing, glassine, greaseproof and other papers.

Chemists and chemical engineers; fourdrinier and cylinder machine foreman; master mechanics; millwrights, plant engineers; rubber chemist; coating foreman.

General Superintendent for large mill making specialty book, offset and other papers.

Salesmen for paper bags, board products, paper tubes, envelope, offset, index, bristol, sulphite bond and ledger papers, one salesman who has contacts in Maine and New Hampshire; machine tenders and back tenders.

We invite correspondence (confidential) with executives seeking positions and with employers seeking new personnel.

CHARLES P. RAYMOND SERVICE, Inc.
294 Washington Street, Boston, Mass.
N-17

WANTED CONVERTING FOREMAN — Familiar all phases converting toilet tissue, towels, napkins. Northern New York Mill. Full resume please. Address Box 49-514 care Paper Trade Journal. N-17

WANTED — Mechanical Engineer, college graduate with experience in paper industry, qualified to be Assistant Chief Engineer in supervising engineering department. Location Massachusetts. Address Box 49-534 care Paper Trade Journal. N-17

WANTED—PLANT ENGINEER to take charge of electrical, steam and mechanical maintenance in two machine mill. Send complete resume giving experience and salary expected to Box 49-536 care Paper Trade Journal. N-17

ADJUSTER—Paper Bag Machines, Potdevin and Lockport flat, square, sack, New York City. Excellent opportunity. State experience. Address Box 49-542 care Paper Trade Journal. D-29

WANTED—Steam Plant Engineer, capable handling high pressure boilers, general steam supervision throughout plant of large paper mill located Northern New England. Write Groveton Papers Company, Groveton, New Hampshire. N-17

WANTED—Plant Engineer for paper mill located in New England. Write Groveton Papers Company, Groveton, New Hampshire. N-17

SALESMEN WANTED by Manufacturer of Paper Napkins and Toilet Tissue. Men with experience to call on Paper Jobbers and Chain Grocers. Territories open New York State, Ohio, West Pennsylvania and Florida. Address Box 49-552 care Paper Trade Journal. N-24

EXPERIENCED Paper Mill Millwright qualified for maintenance of Fourdrinier Machine. Address Box 49-553 care Paper Trade Journal. N-24

MACHINE TENDERS WANTED — Fully experienced on following-folding, set-up and test liner grades. Good steady job. Reply to Ollie Messner, Sangamon Paper Mills, Inc., Eaton, Indiana. N-24

CYLINDER MACHINE TENDERS experienced on Corrugating Medium. Union scale wages. References required. STOCKPORT PAPER CORPORATION, Stockport, N. Y. D-1

SITUATIONS WANTED

PLANT MANAGER—Board and paper conversion; employed; seeks opportunity in company needing cost-minded executive with proven production record and excellent labor relations history. Address Box 49-528 care Paper Trade Journal. N-24

MACHINE TENDER wants position on Board Machine. Light or heavy weights. Best of references. Address Box 49-549 care Paper Trade Journal. D-1

DESIRE POSITION in Production or Technical Department. 35, Ph. D. 8 years experience development and control. Sulphite, kraft, semi-chemical, bleaching, printing and sanitary papers. Address Box 49-545 care Paper Trade Journal. N-17

COATED PAPER CHEMIST—25 years experience, color work, coating dept., production. Past two years resin emulsion coatings. Desire position as coating and converting assistant superintendent or superintendent. Excellent health, progressive, references. Address Box 49-524 care Paper Trade Journal. N-17

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64" SOLID FIBRE BOARD PASTER FOR SALE

With New and Rebuilt Stations to handle 2 or 3 Plys (more Plys added to order) Handles up to 72" Diam. x 60" Wide rolls, producing sheets from 32" to 120" lengths and up to ¼" thick. New Rotary Cut-Off Knife and New Glue Station incorporated in this excellent and guaranteed machine. Complete with Mill Stands, Slitter Station, Press Roller Station, Glue Tanks, Motor, etc. Priced at 1/3rd of to-days Replacement Cost.

Box #49-554. Care Paper Trade Journal.
TF

FOR SALE—1 Fales Paper Slitter, Model C — 40" wide — practically new and in perfect working condition. Address Box 49-551 care Paper Trade Journal. N-17

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WHITE WATER PUMPS
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AGITATOR-PUMPING COMBINATION *(Agi-Flo)*
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Western Sales Office: Mayer Building, Portland, Oregon — Associate: ALEXANDER FLECK LIMITED, Ottawa, Ontario, Canada

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GOOD VALUES—NEW & USED

60" Hamblet Sheeter with Erie layboy and 10 roll backstand, double deck, with shafts and chucks, also 4 sets of slitters. A fine value.

60" Langston heavy board Slitter.

32" Hobbs shear cut Slitter, rebuilt like new.

3-Color Rotary Web Press, 66" cyl.

39" Chandler & Price Automatic Power Paper Cutter.

New 44" National Auto. Power Cutter.

Baling Presses, both hand and power.

Motors, both A.C. & D.C. for any purpose.

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(Plant at Stamford, Conn.) TF

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36" Beck Automatic Roll Sheet Cutter #1115 with sheet Piler #206
Differential Cut Register Attachment
Electronic Eye for 110 V, 60 Cy. Single Phase
Four Extra Rubber Feed Roll Discs
Three Sheet Control Tapes
Cross Bars on Revolving Knife
Brakes on Revolving Knife Shaft
Brakes on Feed Roll Shaft
1½% Overfeed Attachment
Housing Point Board
Motor Bracket
Heavy Model Parent Stand with 2—1-15/16" dia. Shafts, Cones and Brackets to carry 35" dia. rolls
Parent Stand Idler Roll
Machine never erected on floor. Original cost—$6,100. Make an offer.

Address Box 49-550 care Paper Trade Journal. N-17

FOR SALE

FOR SALE OR LEASE

Small paper mill with cylinder machine. Situated advantageously to sources of raw material and sales outlet. Ample room for converting plant in same building. Terms. Address Box 49-357, care Paper Trade Journal. TF

FOR SALE

2—Morden Stock-Makers complete with 200 H.P., 440 volt, 3 phase, 60 cycle motors, plus 1 spare semi-stainless steel filling.

Address Box 49-518 care Paper Trade Journal N-17

FOR SALE

1—Plain Extractor Roll 28" diameter x 150" face.
1—Suction Extractor Roll 22" diameter x 150" face.

HARKERS
1—5' Carthage Disc Barker.
BEATERS
1—600 lb. Beater—iron tub.
BEATER (Laboratory)
1—Dilts Iron Tub Laboratory Beater. Beater roll 14" diameter x 10½" face, including motor.
BRASS FELT ROLLS
9—4" diameter x 140" face (with bearings).
BREAST ROLLS
1—120" x 14".
1—100" x 14".
8—114" x 14".
CALENDER STACKS
1—72" 5 roll Calendar Stack.
1—76" 7 roll calender stack (heavy duty).
CHIPPERS
2—96" Murray 4 knife Chippers.
1—96" 10 knife Carthage Chipper with 200 h.p. motor.
CRUSHER & HAMMERMILL
1—Murray Chip Crusher.
1—Jeffrey Hammermill.
CYLINDER MOULDS
1—36" diameter x 80" face.
1—30" diameter x 72" face.
1—36" diameter x 79" face.
DECKERS
1—Decker—48" diameter x 84" cylinder mold
3—Pusey & Jones Deckers Cylinder molds 42 x 146, anti friction bearings, including rubber covered couch rolls.
3—IMPCO 35½" face x 30" diameter cylinder mold.
DRIVES
2—24 Reeves Drives.
1—32 Reeves Drive.
1—Smith & Winchester mortise gear Drive.
1—Foote—7½ h.p. Speed Reducer (Ratio 240 to 1)
3—Smith & Winchester Mortise Gear Drives with 20" diameter clutches—Ratio 8 to 1
6—Enclosed drives. 75 h.p., ratio 8 to 1. Complete.
DRIVES (Angle)
1—General Machine Company 16 : 1
1—Philadelphia 50:1 — 1 h.p. — 1200 r.p.m
3—Philadelphia 21½:1 — 3 h.p — 1200 r.p.m
V-BELT DRIVE
1—21½" diameter x 7½" face, 5 groove.
1—16½" diameter x 7½" face, 5 groove. (With clutch).
DRYERS
13—48" diameter x 112 face.
30—36" diameter x 102" face.
7—24" diameter x 48" face.
9—36" diameter x 72½" face, with gears and bearings.
1—48" diameter x 91" face.
2—25" x 120" (Baby Dryers).
2—36" x 143".
1—24" x 130".
1—60" diameter x 47" face.
3—36" diameter x 96½" face.
1—48" diameter x 70" face.
2—48" diameter x 92" face.
1—48" diameter x 82" face.
EMBOSSER
1—84" Hudson Sharp Toilet Embosser. Spare engraved roll.
FELT ROLLS
20 Felt Rolls—Brass covered 8" to 12" diameter.
FLAT SCREENS
1—6 plate Shartle Flat Screen.
2—12 Plate Murray Dunbar Flat Screens.
2—14 plate Sandy Hill. (Never used.)
6—12 plate IMPCO Flat Screens.
FRICTION CALENDERS
2—30" Waldron.
2—38" Waldron.
HYDRAULIC PRESS
1—Watson-Stillman Co. (Plated 24" x 24")
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2—Noble and Wood—Mammoth Type.
1—Emerson Jordan—25 to 30 tons capacity —iron plug including new spare iron plug.
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1—Caustic Mixer.
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2—5 h.p. ball bearing—splash proof motors —3/60/440. 1160 r.p.m.
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4 Sections of presses approximately 24" diameter. Rubber and Bronze.
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Various sizes.
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1—3 color 40" Rotary Cottrell Printing Machine, A-1 condition, provision for 2 more colors.
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Various cone and assorted pulleys.
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1—Jones Pulper. Complete with motor and drive.
1—Noble & Wood Pulper—Iron Tub.
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2—Weil Pump Co.—100 g.p.m.—100 P.S.I. including 15 h.p. motors (new equipment).
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1—Goulds Sump Pump—50 g.p.m.—20' head —including motor.
Various sizes of Centrifugal and Plunger Pumps. Write us regarding your particular requirements.
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1—72" Beloit Reel.
ROLLS
900—Brass tube-steel tube—rubber covered iron rolls—various sizes
ROTARY SCREENS
1—#2 Bird Rotary Screen.
1—#2A Bird Rotary Screen.
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1—Saveall—48" diameter x 84" cylinder mold.
3—Pusey & Jones Savealls. Cylinder molds 42 x 146, anti friction bearings, including rubber covered couch rolls.
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40 Plates cut .010.
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Also other sizes and cuts in stock
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1—138" Moore & White Sheeter, duplex, with layboy.
1—74" Downingtown Duplex.
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1—30" Cameron—Type 24-2L.
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1—42" Cameron—Type 24-2A.
1—42" Cameron—Type 9-S.
1—42" Cameron Constant Tension, with pneumatic control
1—62" Cameron—Type 6 (Shear cut).
1—115" 2 drum Waldron.
SQUEEZE ROLL
1—Rubber Squeeze Rolls, 20¾" diameter x 102" face.
STOCK PUMPS
1—10 x 20 Shartle Duplex.
2—7 x 16 Sartle Duplex.
Numerous other Centrifugal Stock Pumps. Advise us to your requirements.
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5—Suction Boxes, 82" drilled face x 6" wide.
SUCTION COUCH ROLL
1—24½" diameter x 160" drilled face.
1—Sandusky 14A" diameter x 103" drilled face.
SUCTION PRESS ROLL SHELL (Only)
1—29¾" diameter x 134" drilled face.
SUPERCALENDER STACK
1—54" 9 roll supercalender stack, completely rebuilt including motors, etc.
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40—Table Rolls 82" face x 3" diameter.
TOILET and TOWEL MACHINES
2—Dietz 81" Toilet & Towel Machines.
TRIMMER
1—56" Smith & Winchester—Undercut.
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2—Proctor & Schwartz Tunnel Dryers, 10 ton and 5 ton capacity.
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1—150 h.p. Westinghouse Type C-Gear Turbine (Recently rebuilt).
VACUUM PUMPS
2—H7 Nash Vacuum Pumps.
VAT
1—Iron end Vat only, for decker or saveall, suitable for cylinder mold 36 x 130.
YANKEE DRYERS
1—8' diameter x 175" face
3—Yankee Dryers 84" diameter x 52, 53 and 62" face.

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1—P&J 120" Ball Bearing Fourdrinier Machine. 60" dryers—suction press and suction couch—Spiral Bevel Gear Drives.
1—Pusey & Jones 82" Fourdrinier Machine Complete.
1—7 cylinder 120" Board Machine, 82 Dryers, 42" diameter. Complete with all auxiliaries.
1—6 cylinder 132" Board Machine, 67 Dryers, 42" diameter. Complete with all auxiliaries.

ANILINE PRESS
1—New Lockport 4 color Aniline Press.

BEATERS
2—Valley Iron 750 lb. Iron Tub—Bronze filled.

BLOWERS
8—Blowers and Mill Exhausters

CALENDER ROLLS
46 Chilled Iron Rolls—Assorted sizes.

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1—104" face 5 roll stack, with drive
1—76" face 7 roll with drive.
1—76" face 3 roll with drive.
1—112" face 7 roll.
1—82" face 5 roll Sandy Hill.

CONVEYOR
1—18½ ft long x 30" wide—with motor.

CYLINDER MOLDS
4—IMPCO 30" diameter x 84" face
1—36" diameter x 136" face Cylinder molds with nets, couches—ball bearing.
2—74" face x 36" diameter.
1—134" face x 36" diameter, with stainless steel shafts.
1—79" face x 56" diameter.

DRIVES
1—6C, Reeves Drive, 40-50 h.p.—Ratio 4 to 1.
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1—De Laval 65 h.p. Ratio 2.24 to 1—616 r.p.m.
1—Falk 60 h.p. Ratio 13 to 1, R.p.m. 1470-113. Herringbone gears.

DRYERS
2—74" face x 28" diameter with gears.
1—143" face x 48" diameter.
4—124" face x 48" diameter.
4—60" face x 36" diameter.
1—77" face x 48" diameter—with gear.
1—84" face x 36" diameter.
18—78" face x 36" diameter, complete with 2 deck frames, gears, bearings and steam joints. Drives, line shaft and felt rolls are available.
1—78" face x 18" diameter with gears and bearings.
1—120" face x 10" diameter—Baby Dryer.
2—62" face—38" diameter—Bearings and gears.
6—96" face x 48" diameter.
95—120" face x 42" diameter.

ELECTRIC PAPER MACHINE DRIVES
1—G. E. 55/110 with G. E. Generator, Exciter and Controller.
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EXTRACTOR ROLLS—SUCTION
1—Downingtown—64" face x 17" diameter with bearings & stand.

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1—New Sandy Hill 12 plate, with scrapers and V-belt drive.
1—Montague 6 plate—ball bearing.

FOURDRINIER SECTIONS
1—P & J 156" x 80 ft. ball bearing. Complete from inlet to 22" diameter suction couch. Brass and Rubber covered table rolls. 6 Brass Suction Boxes operated at 1000' per minute
1—M & W 82" x 40' complete with 3 suction boxes, shake, 3 section presses and size press.

HEAD BOXES
1—118" Bronze Lead Lined Sweco

INLETS
1—Voith Inlet for 151" wire with 28" slice. Complete, including drive.
1—90" All bronze—adjustable.
1—141" Beloit complete with distributor roll.

JORDANS
2—Jones Standard.
1—Jones Stanguro—ball bearing
1—23 Miami, for motor drive.
1—Jones Majestic, roller bearing—stainless steel filling—for motor drive.
1—Jones Majestics with base and coupings—bronze filled, 2 sets of new bronze fillings
2—23 Appleton with base and coupling—bronze filled.
1—Dillon Horse 22—direct connected 75 h.p. Stainless steel ½" filling.
1—22 Smith & Winchester—Ball bearing.

LABORATORY EQUIPMENT
1—Cavanaugh 2 roll 12" calender. Steam fitted rolls.
1—16" Coating Machine.

MOTORS
1—Fairbanks Morse — 50 h.p. — 495 r.p.m. — 220/440/3 ph.—60 cycle.
1—Reliance 25 h.p. ball bearing, 550 v., 3 phase, 60 cycle—1750 r.p.m.
1—General Electric—75 h.p.—430 r.p.m. 440v—3 ph.—60 cycle.

PULLEYS
30—Split cast iron tapered Pulleys.

PULP EQUIPMENT
1—Jagger—1 deck—vibrating screen
1—Mitts & Merrill 217 Pulpwood chipper
1—5' Carthage Disc Barker
1—88" Carthage Ball Bearing Chipper—4 cutters

PULPERS
2—22 Lamoyne Pulpers—with drives.

PUMPS
44—Centrifugal Pumps, open & closed Impellers. Direct connected or Belt Driven. Extended base for motor. Assorted capacities and heads. Most used less than one year. Also new Goulds Pumps.

REELS
2—Beloit 110" two bowl Reel.
1—Beloit 132" two bowl upright reel.
1—Beloit 116" two bowl upright reel.

ROLLS—PRESS, COUCH, etc.
32—Press rolls, brass and rubber covered.
14—Couch rolls, brass and rubber covered.
250—Brass and steel carrying rolls.

ROTARY SCREENS
2—Jones Lattiwalk—cylinder 84" face x 26" diameter.
1—22 Leith-walk-ball bearing.
1—23A Bird with motor. Used less than 1 year.

SCREW PRESSES
2—Valley Voith Screw Presses Size 2A with new spare sets of plates.

SHEETERS
1—Beloit Duplex 104", complete with drive.
1—Hamblet Duplex—138"
1—Moore & White 64" Sheeter with Moore & White layboys.
1—12 roll Hamblet heavy duty backstand.
1—6 roll heavy duty backstand.

SHREDDERS
1—American 32" Hammermill, anti-friction bearing.
8—Sprout Waldron Cutters — type F-11 — 30" knives. Used 30 days.

SLITTERS & WINDERS
2—Pusey & Jones 100" high speed slitters and rewinders.
1—New 56" Cameron Model 6.
1—Beloit 2 drum 128" with 8 slitters.
1—Langston 68" 21 shear cut slitters. Rewinds to 42" with 5 h.p. 220-440 volt motor.

STUFF PUMPS
1—Shartle 8½x12 Triplex—Silent Chain Drive.

SUCTION COUCH ROLLS
Millspaugh 23" diameter x 138¾" couch face
1—Millspaugh 22" diameter x 138" drilled face.
1—Beloit 107" drilled face x 22" diameter. Anti friction bearings.
1—Millspaugh—14½" diameter x 93" drilled face.

SUCTION PRESS ROLLS
1—Downingtown 29" diameter x 100" drilled face.
1—Beloit 22" diameter x 105" drilled face for direct drive. Anti friction bearings.

SUPER CALENDER
1—7 roll 62" face.
1—7 roll 68" face.
1—7 roll 56" face.

TRIMMERS
1—84" Seybold Precision with motor and five spare knives.

VACUUM PUMPS
1—H2 Nash for motor drive.

FOR SALE

FOR SALE

1—Roll-O-Finer (Manufactured by Paper and Industrial Appliances, Inc.) Complete with G.E. motor, starter and auxilliary equipment. All equipment is in excellent condition. Address: Box 49-546 care Paper Trade Journal. D-1

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FOR SALE

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1—Goulds 8 x 6 1200 g. p. m. 60 ft. head
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7—Goulds 3 x 3 75 g. p. m. 30 ft. head.

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N-17

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WANTED—Brightwood Box Machine. Address Box 49-275 care Paper Trade Journal

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D-8

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Type "AA" — one of five sizes and types built for every grade of paper.

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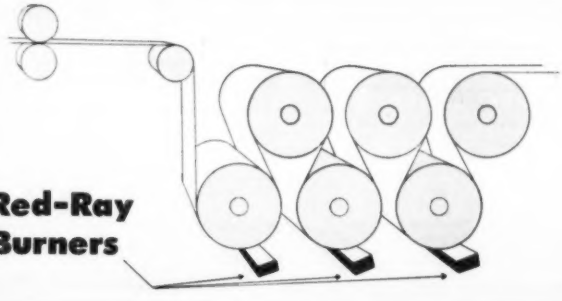

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1 plan helps prevent all 3

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The more U. S. Savings Bonds an employee holds, the more secure he feels. The more secure he feels, the greater his peace of mind—the more contented, careful, and productive he is on the job.

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Bond sales spread the national debt, thus increasing our national economic security. And, of course, what's good for the nation is good for you and your business!

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Five Steps Boost Participation

1. See that a top management man sponsors the Plan.

2. Secure the help of the employee organizations in promoting it.

3. Adequately use posters and leaflets and run stories and editorials in company publications to inform employees of the Payroll Savings Plan's benefits to them.

4. Make a person-to person canvass, once a year, to sign up participants.

These first four steps should win you 40-60% participation. Normal employee turnover necessitates one more step:

5. Urge each new employee, at the time he is hired, to sign up.

Nation-wide experience indicates that 50% of your employees can be persuaded to join—without high-pressure selling. All the help you need is available from your State Director, U. S. Treasury Department, Savings Bonds Division. He is listed in your telephone directory. Wouldn't it be a good idea to call him right now, while it's on your mind?

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PAPER TRADE JOURNAL

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D. J. Murray Mfg. Co.
Moore & White Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Valley Iron Works Co.

ALLOYS
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APRON CLOTH
Williams-Gray Co.

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Potdevin Machine Co.
Smith Wincheater Mfg. Co.
Weber, Herman G., & Co., Inc.

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Appleton Machine Co.
Carthage Machine Co.
D. J. Murray Mfg. Co.
Valley Iron Works Co.

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E. D. Jones & Sons Co.
The Moore & White Co.
Shartle Brothers Machine Co.
Stephens-Adamson Mfg. Co.
Valley Iron Works Co.

BEARINGS
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E. D. Jones & Sons Co.
Link Belt Company
Magnus Metal Corp.
The Moore & White Co.
Shartle Brothers Machine Co.
Timken Roller Bearing Co.
Valley Iron Works Co.

BEATERS AND JORDANS
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Black-Clawson Company
Dilts Machine Works, Inc.
Downingtown Mfg. Co.
E. D. Jones & Sons Co.
Morden Machines Co.
J. J. Ross Company
Ross Paper Machy. Co.
Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works Co.

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Dilts Machine Works, Inc.
Downingtown Mfg. Co.
Farrel-Birmingham Co., Inc.
E. D. Jones & Sons Co.
Lukenweld, Div., Lukens Steel Co.
Shartle Brothers Machine Co.
Valley Iron Works Co.

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Allis-Chalmers Mfg. Co.
The Cincinnati Rubber Mfg. Co.
The Goodyear Tire & Rubber Company
Link Belt Company
J. E. Rhoads & Sons

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General Dyestuff Corp.
Rohm & Haas Co.
Virginia Smelting Co.

BLEACHING BOILERS, ROTARY
The Bigga Boiler Works Co.

BLEACHING APPARATUS
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Perkins & Sons, Inc., B. F.
Moore & White Co.
Niagara Alkali Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.

BLOW PIPES & PITS
Carthage Machine Co.
Kalamazoo Tank & Silo Co.
Moore & White Co.
Murray Mfg. Co., D. J.
Walworth Company

BOILERS
Babcock & Wilcox Co.
The Bigga Boiler Works Co.

BOTTOMS
Kalamazoo Tank & Silo Co.
Valley Iron Works Co.

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M. W. Jenkins Sons, Inc.

BRUSHES
M. W. Jenkins Sons, Inc.

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B. F. Perkins & Son Inc.
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Farrel-Birmingham Co., Inc.
Lobdell Co.
Edward J. McBride
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Perkins & Sons, Inc., B. F.
J. J. Ross Company
Ross Paper Machy. Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works Co.
Waldron Corp., John

CARRIER ROPE
Williams-Gray Co.

CASEIN
American Cyanamid Co., Industrial Chem. Div.
Hercules Powder Co.,

CASTINGS
American Cast Iron Pipe Co.
Appleton Machine Co.
Babcock & Wilcox Co.
Black-Clawson Company
Carthage Machine Co.
Dilts Machine Works
Downingtown Mfg. Co.
Farrel-Birmingham Co.
Hamblett Machine Co.
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Lobdell Co.
Magnus Metal Corp.
Michigan Steel Casting Co.
The Sandy Hill Iron & Brass Works
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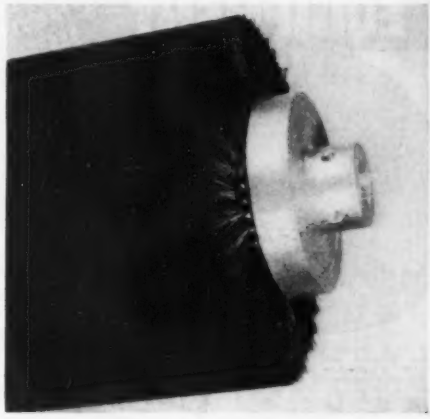

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These brushes were designed from a knowledge of paper manufacturers' brush problems acquired in our many years of service to the paper industry.

They replace old type coating and color spraying brushes that warp and get out of alignment, and they last 3 to 12 times longer.

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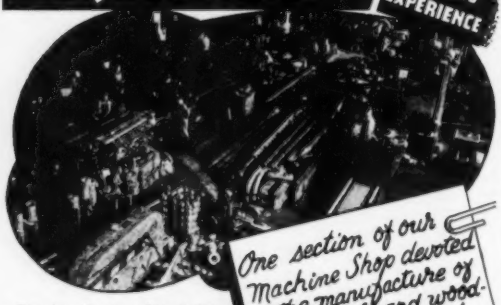

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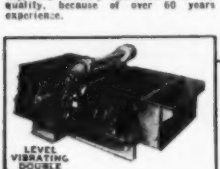

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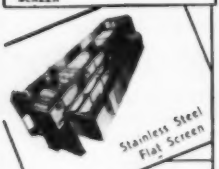

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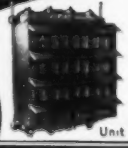

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Link Belt Company

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Diamond Alkali Co.
Dow Chemical Company
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General Dyestuffs Corp.
Geigy Co., Inc.
Gottesman & Co.
Hercules Powder Co.
Hooker Electrochemical Co.
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Monsanto Chemical Company
National Aluminate Corp.
Niagara Alkali Company
Nopco Chemical Co.
Pittsburgh Plate Glass Co., Columbia Chemical Division
Rohm & Haas Co.
Solvay Sales Corp.
Virginia Smelting Co.
Wyandotte Chemical Corp.

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Kalamazoo Tank & Silo Co.

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The Dow Chemical Company
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General Dyestuff Corp.
Monsanto Chemical Company
Nopco Chemical Co.
Pittsburgh Plate Glass Co.
Solvay Sales Corp.
Wyandotte Chemicals Corp., J. B. Ford Division

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Link Belt Company
Moore & White Co.
D. J. Murray Mfg. Co.
The Sandy Hill Iron & Brass Works

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Dilts Machine Works
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Hudson Sharp Machine Co.
The Mayer Machine Co., Inc.
Moore & White Co.
Potdevin Machine Co.
Shartle Brothers Machine Co.
Waldron Corporation, John
Weber, Herman G., & Co., Inc.

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The Goodyear Tire & Rubber Company
Hercules Powder Co.
Monsanto Chemical Company
Nopco Chemical Co

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Bird Machine Company
DeZurik Shower Company
Paper & Industrial Appliances

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Ferguson, Hardy S.
C. M. Guest & Sons
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Roderick O'Donoghue
The Rust Engrg. Co.
J. E. Sirrine & Co.
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H. G. Weber & Co., Inc.
Frederick Wierk

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The Brown Instrument Co
Cochrane Corp.

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The Brown Instrument Co.
Johnson Corp.
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Link Belt Company
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Rodney Hunt Machine Co.
Smith & Winchester Mfg. Co
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Moore & White Co.
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Shartle Brothers Machine Co
Valley Iron Works
Waldron Corp., John

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Link Belt Company
Whiting Corp.

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Moore & White Co.
Perkins & Son, Inc., B. F.
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Taylor, Stiles & Co.

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M. W. Jenkins Sons, Inc.
National Tube Co.

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Valley Iron Works Co.

DECKLE WEBBING
Williams-Gray Co.

DE-INKING
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Kinsley Chemical Co.
Roderick O'Donoghue
Shartle Brothers Machine Co

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Kinsley Chemical Co.
Monsanto Chemical Company

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General Dyestuff Corp.
Monsanto Chemical Company
Nopco Chemical Co.
Rohm & Haas Co.
Wyandotte Chemicals Corp.

DEWAXING CHEMICALS
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Nopco Chemical Co.

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Lukenweld
Pusey & Jones Corp.

DIRTEC
Bird Machine Co.

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Monsanto Chemical Company
Nopco Chemical Co.
Rohm & Haas Co.

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Lobdell Co.
Lodding Engineering Corp.
The Moore & White Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.

DOCTOR BLADES
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Black-Clawson Company
Lodding Engrg. Corp.
The Moore & White Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.

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Hardinge Company, Inc.
Lukenweld
The Moore & White Co.
Murray Mfg. Co., D. J.
J. J. Ross Company
Red-Ray Mfg. Co., Inc.
Ross Paper Marchy. Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Valley Iron Works Co.
The Youngstown Welding & Engrg. Co.

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Appleton Machine Co.
Bird Machine Co.
Black-Clawson Company
Chain Belt Company
Davis, Frank H., Co.
Dilts Machine Works
Downingtown Mfg. Co.
Fairbanks, Morse & Co.
Farrel-Birmingham Co.
General Electric Company
Gibbs-Brower Company, Inc.
Rodney Hunt Machine Co.
Link Belt Company
Moore & White Co.
Murray, D. J., Mfg. Co.
Pusey & Jones Corp.
J. J. Ross Company
Ross Paper Machy. Corp.
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Syon Mfg. Co.
Valley Iron Works Co.
Westinghouse Electric Corp.

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E. D. Jones & Son Co.
Moore & White Co.
D. J. Murray Mfg. Co.
John Waldron Corp.

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Ciba Company
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Geigy Co., The
General Dyestuffs Corp.
National Aniline Division, Allied Chemical & Dye Corp.
C. K. Williams & Co.
Witco Chemical Co.

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Frank W. Egan & Co.
Gibbs-Brower Company, Inc.
Northern Engraving & Mch. Co
B. F. Perkins & Son, Inc.
John Waldron Corp.

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Nopco Chemical Co
Rohm & Haas Co.
Wyandotte Chemicals Corp

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Pillsbury Mills, Inc.
Vanderbilt Co., R. T.

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Swenson Evaporator Co., Div of Whiting Corp.

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KNIFE GRINDER
FOR
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Vanderbilt Co., R. T.
Witco Chemical Co.

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Farrel-Birmingham Co.
E. D. Jones & Sons Co.
Link Belt Company
Moore & White Co.
D. J. Murray Mfg. Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co
Smith & Winchester Mfg. Co
Valley Iron Works Co
Westinghouse Electric Corp

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Gibbs-Brower Company, Inc
Lobdell Co.
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D. J. Murray Mfg. Co.
Red-Ray Mfg. Co., Inc.
Ross Engineering Corp., J. O
Stickle Steam Specialties Co.
Valley Iron Works Co.
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Bahr Brothers Mfg. Co.
E. D. Jones & Sons Co.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works Co.

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Dilts Machine Works, Inc
Hamblet Machine Co.
Heppenstall Company
E. D. Jones & Sons Co.
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Taylor Stiles & Co.
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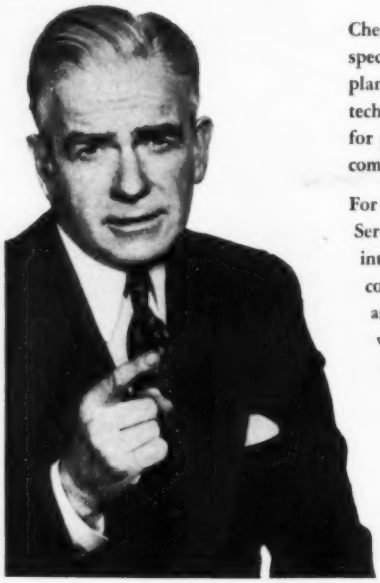
Bauer Brothers Co.
The Biggs Boiler Works Co.
Bird Machine Company
Dilts Machine Works
W. & L. E. Gurley
E. D. Jones & Sons Co.
Leeds & Northrup Company
National Technical Laboratories

"Why You Should Specify SOLVAY"



SOLVAY

Soda Ash
Caustic Soda
Caustic Potash
Chlorine
Potassium Carbonate
Calcium Chloride
Nytron
Sodium Bicarbonate
Specialty Cleansers
Ammonium Bicarbonate
Sodium Nitrite
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Ortho-dichlorobenzene
Monochlorobenzene
Methanol
Ammonium Chloride
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Chemicals are not bought on the basis of price and specifications alone. Other factors must be considered . . . plant facilities, plant locations, length of experience, technical service, convenience of warehouse locations for prompt and economical delivery. All these combine to make *Solvay* the logical choice for alkalies.

For example . . . Solvay "Industry-Wise" Technical Service combines an expert skill in alkalies with an intimate knowledge of *your* industry to offer invaluable counsel and guidance in the use of alkalies and associated chemicals. And more than two hundred warehouses and stock points from coast to coast serve you promptly and economically.

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Farrel-Birmingham Co.
Lobdell Co.
Testing Machines, Inc.

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Fairbanks, Morse & Co.
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Perfecting Service Corp.
Shartle Brothers Machine Co.

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Black-Clawson Company
Downingtown Mfg. Co.
Gibbs-Brower Company, Inc.
Thomas W. Hall Co.
Lukenweld
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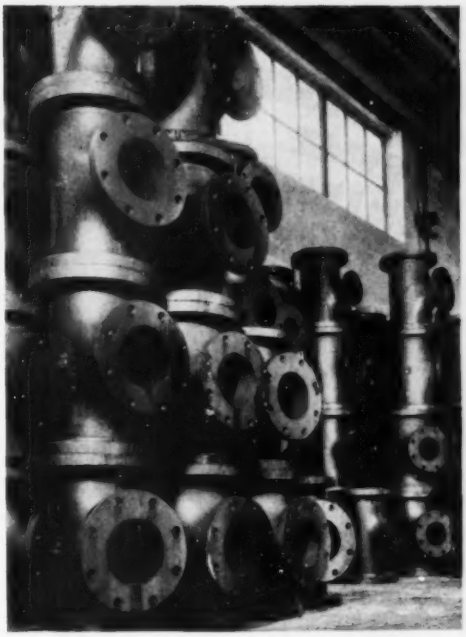

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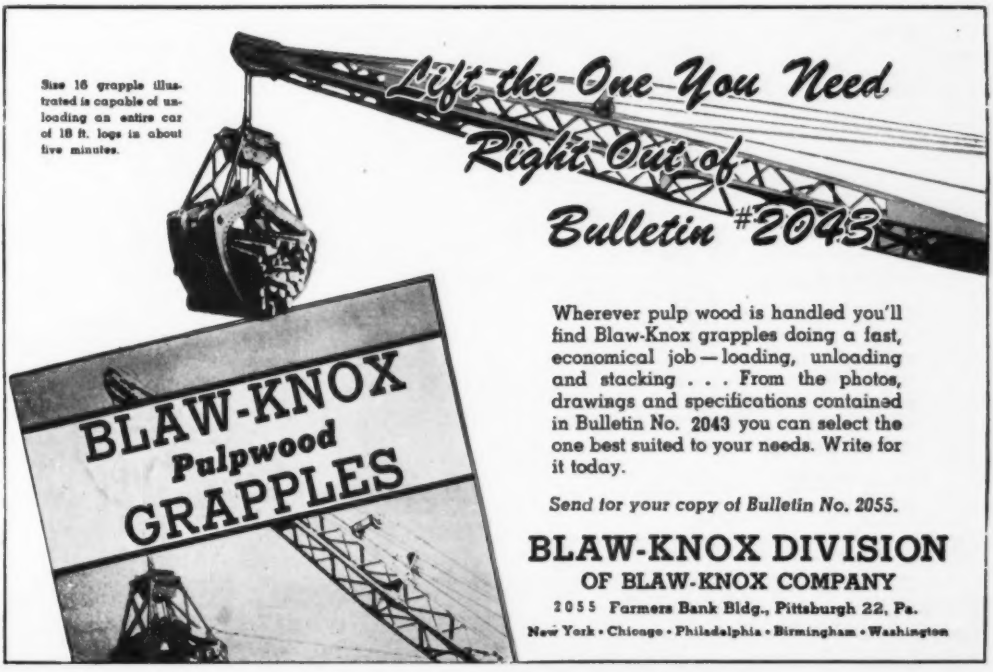
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